297

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CONTENTS

TRADE NAME	MODEL	SET AND FOLDER No.
Crosley	Ch. 431-1, -3, -4, 432-1, -3, 443, -3 Tel. Rec., Prod. Chg. Bul. 137	297-1
General Electric	21C106, 21C107, 21C108, 21C109, 21T32, 21T33, 21T36, 21T37 ("N" Line) Tel. Rec.	297-2
Granco	720	297-3
Magnavox	TP251MA	297-4
Nordic	501F55	297-5
Olympic	21CZ57, 21CZ72, 21DZ73, 21KZ23, 21KZ25, 21KZ39, 21TZ56, 22DZ101, 22DZ116, 22DZ120, 22DZ121, 22DZ122, 22DZ123, 22DZ124 (Chassis "Z") Tel. Rec.	297-6
Raytheon	C-2168, UC-2167, UC-2168, UM-2182C, G, UM-2183A, C, G, K (Ch. 21T26AGH, 21T193AGH, 21T274AGH, 21T274AS) Tel. Rec.	297-7
Silvertone	4072 (Ch. 567.34000 & Amp. Ch. 567.35000), 6072 (Ch. 567.34003 & Amp. Ch. 567.35002) Recorder	297-8
Webster-Electric	97-0	297-9
Wells-Gardner	321AM55-A-432-1, 321AM55-A-486-2, 321AM56-A-432-1, 321AM56-A-486-2, 2321AM55-A-488-2, 2321AM56-A-488-2 Tel. Rec.	297-10
Zenith	HFR845R, HFR846E, H (Ch. 8R21)	297-11

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 3 IN SET 279

Crosley chassis 431-1, 431-3, 432-1, 432-3, 443 and 443-3 were covered in Photofact Folder 3 – Set 279.

Chassis 431-4 is added with the publication of this bulletin along with model additions and production changes.

Following is a complete list of all models and chassis used in each.

MODEL	CHASSIS	MODEL	CHASSIS
H-17TOBHa	432-1	H-21HCMHa	431-1
H-17TOBHd	432-3	H-21HCMHd	431-3
H-17TOMHa	432-1	H-21HCWHa	431-1
H-17TOMHd	432-3	H-21HCWHd	431-3
H-17TOMNHa	432-1	H-21HPBHa	443
H-17TOWHa	432-1	H-21HPBHd	443-3
H-17TOWHd	432-3	H-21HPWHa	443
H-21CCOBH	431-4	H-21HPWHd	443-3
H-21CCOMH	431-4	H-21TCOBH	431-4
H-21CCOWH	431-4	H-21TCOMH	431-4
H-21COBHa	431-1	H-21TCOWH	431-4
H-21COBHd	431-3	H-21TOBHa	431-1
H-21COMHa	431-1	H-21TOBHd	431-3
H-21COMHd	431-3	H-21TOBUf	431-1
H-21COSBHa	431-1	H-21TOMUf	431-1
H-21COSBHd	431-3	H-21TOWUf	431-1
H-21COSHa	431-1	H-21TOMHa	431-1
H-21COSHd	431-3	H-21TOMHd	431-3
H-21COWHd	431-3	H-21TOWHa	431-1
H-21HCBHa	431-1	H-21TOWHd	431-3
H-21HCBHd	431-3		

Ch. 431-1

MODELS ADDED

Models H-21TOBUf, H-21TOMUf and H-21TOWUf are identical to models covered under chassis 431-1, except for the addition of a UHF converter part #159952-1.

A schematic (Fig.#1) and alignment procedure for this UHF converter are given in this bulletin.

Ch. 431-4CX

NEW CHASSIS ADDED

Chassis 431-4 is identical to the chassis covered, except for the following changes.

A new VHF cascode tuner (part #159023-1) is incorporated in this chassis.

A schematic (Fig.#2) and alignment procedure are given in this bulletin.

COMPONENT CHANGE

C29 is increased from 1000MMF to 5000MMF.

A 1KΩ resistor is added from pin 8 of V5 to the junction of L19 and R33.

A 5000MMF capacitor is added from the junction of L19 and R33 to ground.

L22 is wound on a 1.8KΩ resistor. The part number is changed to 159215-1.

R39 is decreased from 5.6KΩ to 4.7KΩ.

A noise gate control circuit is added. A partial schematic is given in Fig. #3 showing the new circuit .

Ch. 443-3

NEW VHF TUNER

A new tuner (part #158847-1) is incorporated in chassis 443-3. A schematic (Fig.#4) and alignment procedure are given in this bulletin.

CROSLEY CHASSIS 431-1, 431-3, 431-4, 432-1, 432-3, 443, 443-3

PROPERTY OF
L. F. BLANKENSHIP
3921 MEADE ST.
DENVER, COLORADO

PRODUCTION CHANGES
BULLETIN 137

PRODUCTION CHANGES
BULLETIN 137

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

	CODE LETTER CHANGES The engineering code letter that is stamped immediately after the chassis number indicates that certain circuit changes have been made in that particular chassis.
Ch. 431-1C	Following is a list of these changes. This circuit change in the vertical oscillator and vertical output circuit is shown by the dotted lines on page 2 of Photofact Folder 3 in set 279 and applies only to chassis 431-1C.
Ch. 431-1AX, -1BX, -1CX, -1DX, -1E, -1EX -1FX, -1GX, -3AX, -3B, -3BX, -3CX, -4AX, -4B, -4BX, 432-1AX, -3AX, 443A, AX B, BX, 443-3, -3A, -3AX, -3B, -3BX	TO IMPROVE INTERLACE, PICTURE QUALITY AND VERTICAL STABILITY A .1MFD, 600V capacitor is added from the 150V line coming out of the tuner to ground. C29 is increased from 1000MMF to 5000MMF. The vertical oscillator circuit has been changed and a partial schematic showing the new circuit is given in Fig. #5. R75 is omitted. C70 is decreased from 1300MMF to 560MMF. R35 is removed from ground and a video peaking coil (part #158628-1) is connected from R35 to ground. R39 is decreased from 5.6KΩ to 4.7KΩ.
Ch. 431-1GX, 431-3CX	TO ELIMINATE HORIZONTAL BENDING ON STRONG SIGNALS A .02MFD, 600V capacitor is added from the AGC input to the tuner to ground.
	COMPONENT CHANGE In some chassis C4 is included with C1. The new part numer for C1 becomes 159242-1.

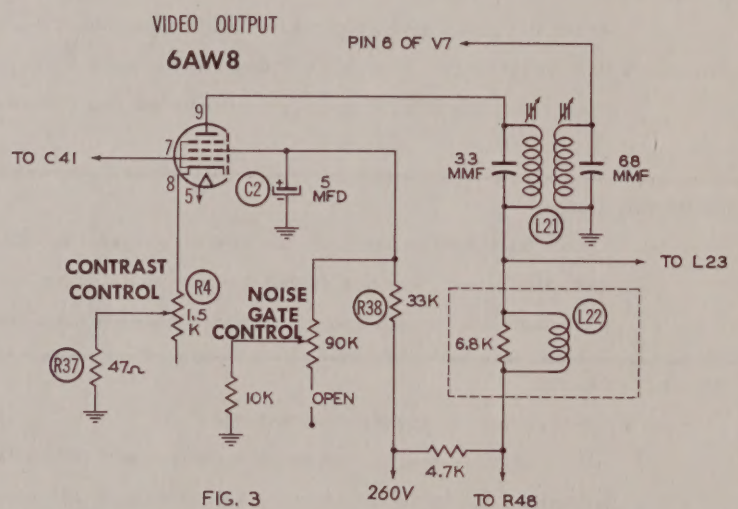


FIG. 3

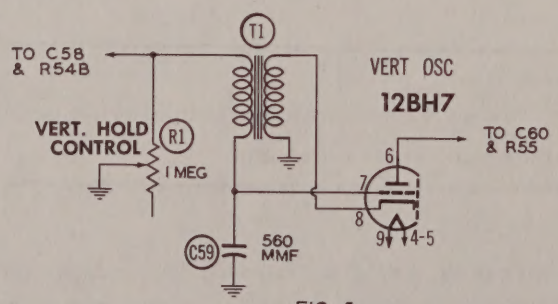


FIG. 5

PROPERTY OF
F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

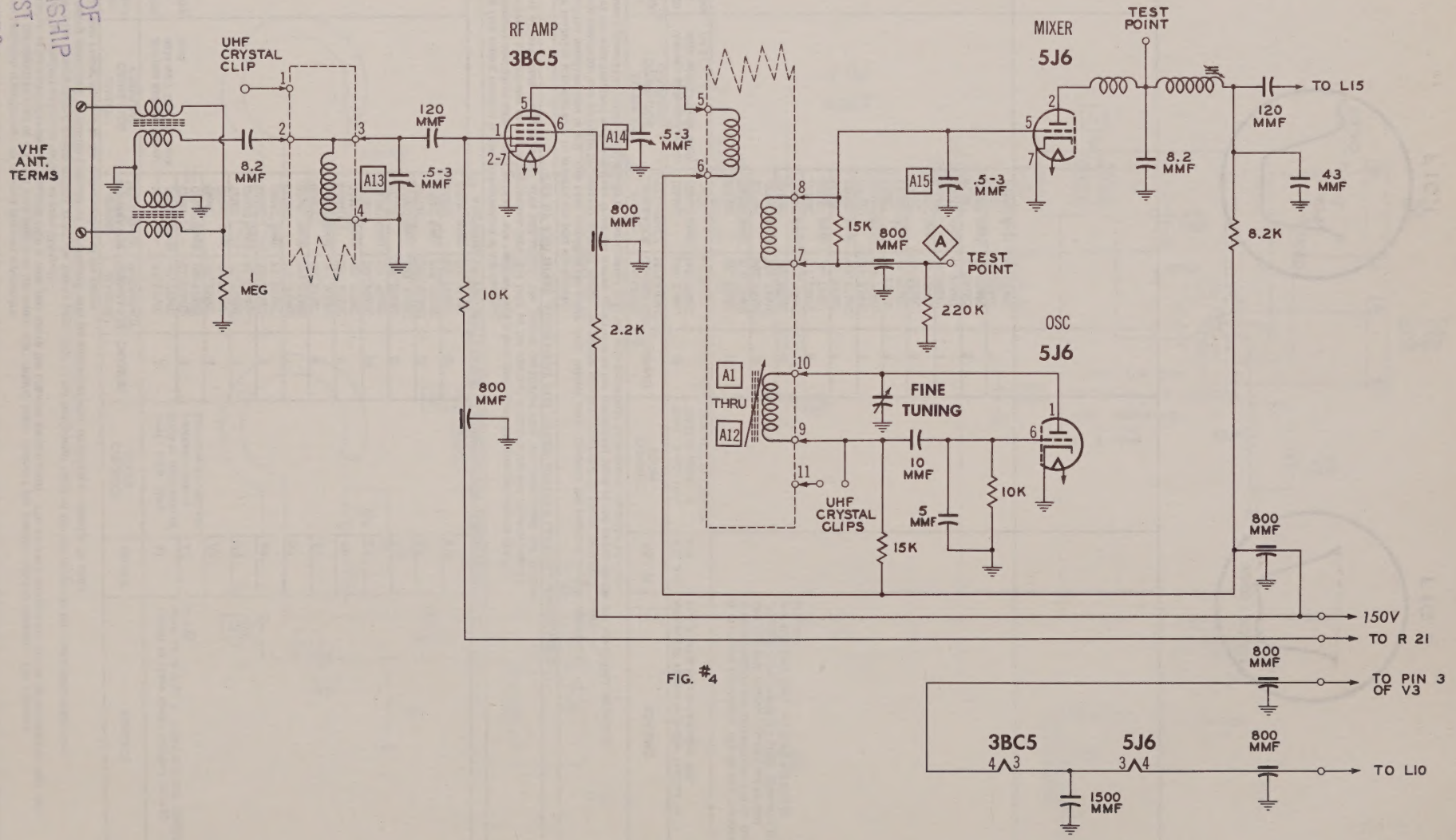


FIG. #4

VHF OSCILLATOR ALIGNMENT FOR TUNER #158847-1 USED IN CHASSIS 443-3

Use an isolation transformer to protect the test equipment.
Connect the negative lead of a 3 volt bias supply to the tuner AGC (white) lead. Connect the positive lead to chassis. The channel oscillator adjustment screws are reached thru a hole just above the channel switch shaft. The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	57MC (10MC Swp)	55.25MC 59.75MC	2	Vert. Amp. thru 10KΩ to high side of contrast control. Low side to chassis.	A1	Adjust to place sound marker in trap notch as in Fig. 1. Video marker should be at 40%.
			63MC (10MC Swp)	61.25MC 65.75MC	3		A2	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A3	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A4	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A5	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A6	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A7	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A8	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A9	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A10	
			207MC (10MC Swp)	205.25MC 209.75MC	12		A11	
			213MC (10MC Swp)	211.25MC 215.75MC	13		A12	

ALTERNATE VHF OSCILLATOR ALIGNMENT FOR TUNER #158847-1

Set the fine tuning control to the mid-position of its range.
The channel oscillator adjustment screws are reached thru a hole just above the channel switch shaft.
The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel.
Tune in all available stations in that area and adjust the proper oscillator slug for best sound and picture.

VHF RF AND MIXER ALIGNMENT FOR TUNER #158847-1 USED IN CHASSIS 443-3

Use an isolation transformer to protect the test equipment.
Connect the negative lead of a 2 volt bias supply to the tuner AGC (white) lead. Connect the positive lead to chassis.
If sweep generator has no built-in marker loosely couple separate marker generator to sweep generator output.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
2.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru 10KΩ to point A . Low side to chassis.	A13, A14, A15	Adjust for response curve similar to Fig.2 with markers above 90%.
3.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		If markers fall below 70% on any channel make compromise adjustment of A13, A14 and A15 with channel switch set to that channel, then check all other channels to see that they have not been seriously affected.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

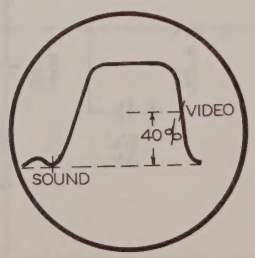


FIG.1

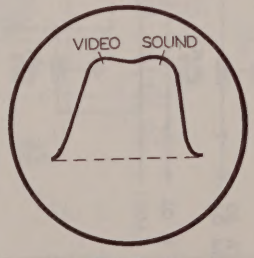


FIG. 2

PROPERTY OF
L. F. BLANKENSHIP
3021 MEADE ST.
DENVER, COLORADO

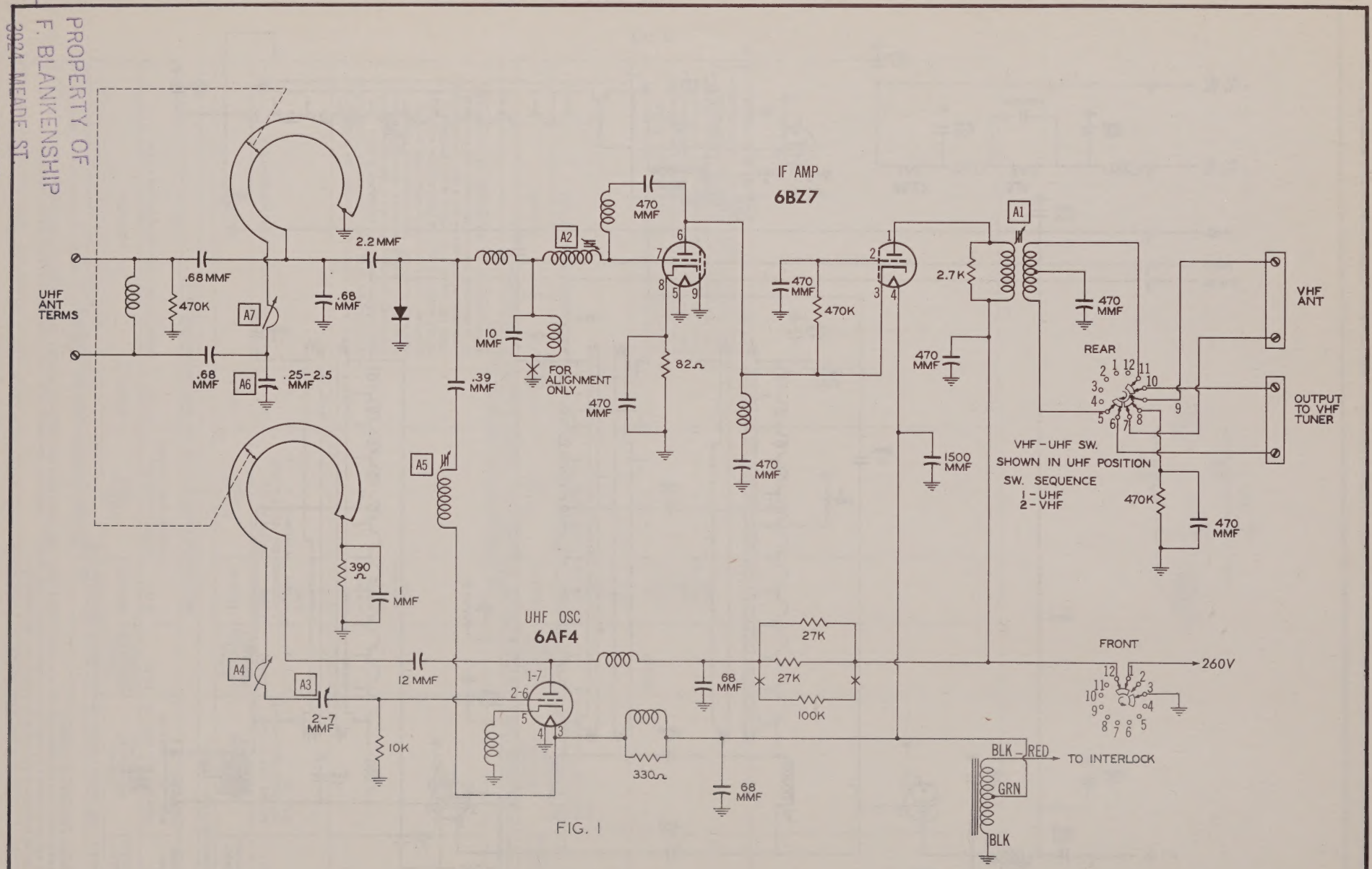


FIG. 1

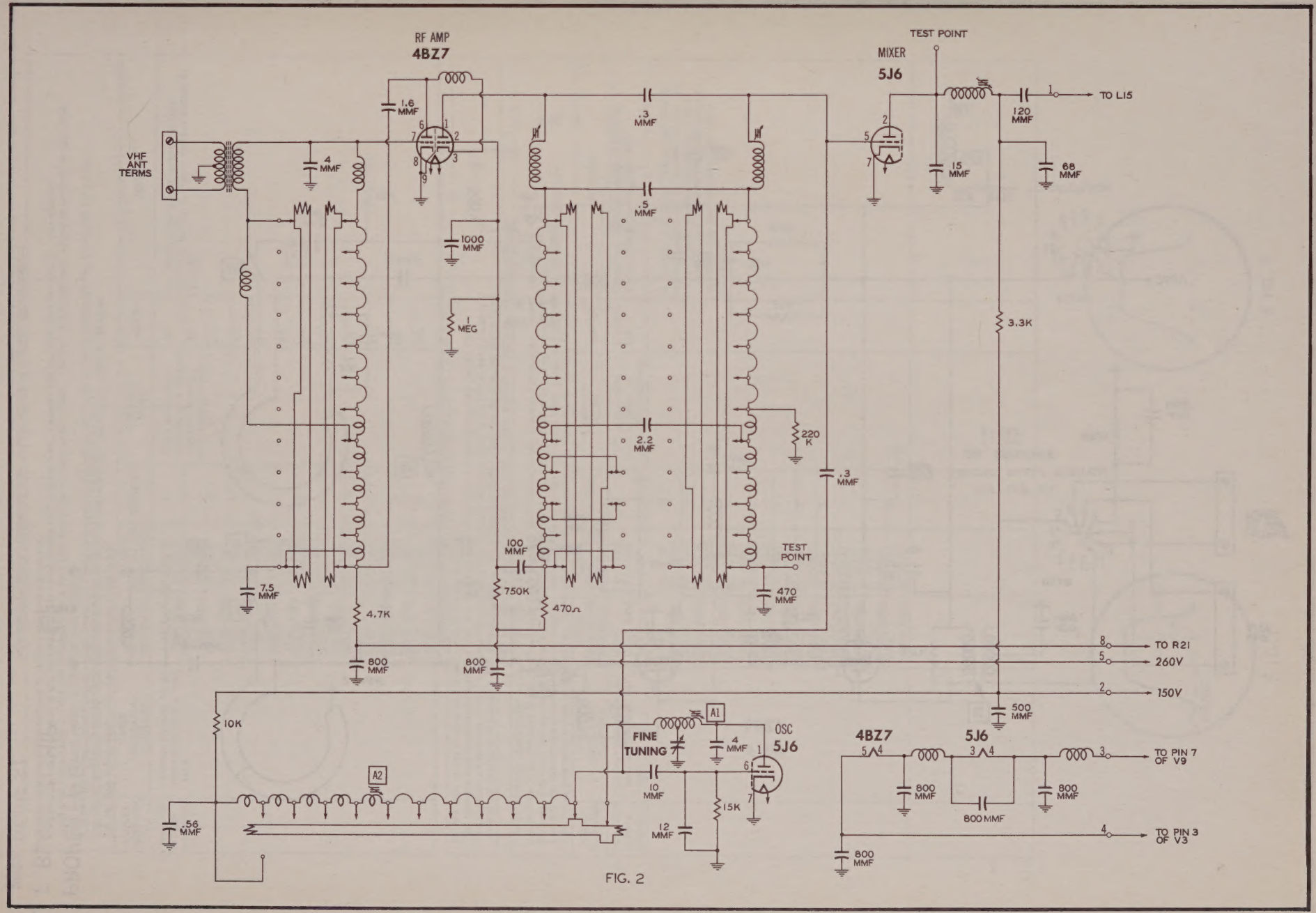

RF AMP
4BZ7
MIXER
5J6
TEST POINT
VHF ANT TERMS
1.6 MMF
.4 MMF
.3 MMF
.5 MMF
1000 MMF
1 MEG
2.2 MMF
220 K
.3 MMF
100 MMF
750K
470Ω
7.5 MMF
4.7K
800 MMF
800 MMF
470 MMF
TEST POINT
120 MMF
15 MMF
68 MMF
TO L15
3.3K
TO R21
260V
150V
500 MMF
10K
A1
A2
FINE TUNING
4 MMF
OSC
5J6
10 MMF
15K
12 MMF
.56 MMF
4BZ7
5J6
800 MMF
800 MMF
800 MMF
800 MMF
TO PIN 7 OF V9
TO PIN 3 OF V3

FIG. 2

UHF CONVERTER ALIGNMENT PART #159952-1 USED WITH CHASSIS 431-1 (H-21TOMUF SERIES)

Use an isolation transformer to protect the test equipment.
It will be necessary to manually set tuner switch to UHF position, disengage the linkage from the switch shaft by loosening two set screws which secure the hub assembly and arm to the switch shaft. The converter switch shaft will be fully clockwise when in UHF position.
Set the VHF tuner to channel 6.

IF ALIGNMENT OF UHF CONVERTER (#159952-1).

Connect a 50Ω carbon resistor across output of signal generator.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	250Ω Carbon Resistor	High side thru 250Ω to point (A). Low side to chassis.	82MC	5 or 6	VTVM across 2nd. detector load resistor.	A1, A2	Adjust for maximum deflection on VTVM.

OSCILLATOR ALIGNMENT OF UHF CONVERTER (#159952-1)

Maintain 117V line voltage.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
2.	Fig. 1	Across UHF antenna terminals thru network (Fig. 1).	460MC	UHF converter switch shaft maximum CCW.	VTVM across 2nd. detector load resistor.	A3	Adjust for maximum deflection on VTVM.
3.	"	"	904MC	UHF converter switch shaft maximum CCW.	"	A4, A5	Adjust A4 for maximum deflection. A4 is adjusted by moving tab up or down. Disconnect crystal return choke coil at point "X". Connect a 0-10MA millimeter between open end of coil and chassis. Adjust A5 for maximum crystal current with tuner shaft fully clockwise. With normal line voltage maximum current should be 5MA. With low line voltage maximum current should not be more than .3MA with tuning switch shaft in any position. If necessary, repeat steps 1 and 2 until maximum reading is obtained. Remove MA meter and reconnect crystal return choke coil (at point "X") to chassis.

RF ALIGNMENT OF UHF CONVERTER (#159952-1)

Disconnect crystal return choke coil at ground point "X" as in step 3 under "Oscillator Alignment of VHF Converter".

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
4.	Fig. 1	Across UHF antenna terminals thru network (Fig. 1).	460MC	UHF converter switch shaft maximum CCW.	VTVM across 2nd. detector load resistor.	A6	Adjust for maximum deflection.
5.	"	"	904MC	UHF converter switch shaft maximum CCW.	"	A7	Adjust A7 for maximum deflection. A7 is adjusted by expanding or compressing coil turns. Repeat steps 4 and 5 until no change in maximum deflection. Reconnect crystal return choke coil to ground ("X"). Reconnect switch shaft to linkage and check mechanically for normal operation. With UHF tuning shaft fully counter clockwise all VHF contact positions should be firmly made and all UHF contacts must be fully open.

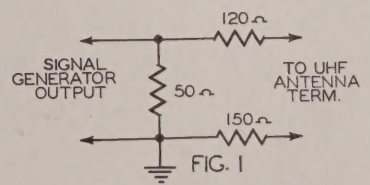


FIG. 1

VHF OSCILLATOR ALIGNMENT FOR TUNER 159023-1 USED IN CHASSIS 431-4.

Allow receiver to warm-up for approximately five minutes.
Set the station selector switch to highest channel available in that area. Adjust contrast and volume control for normal reception.
Set the fine tuning control at the center of its range. With a non-metallic alignment tool adjust the slotted head brass screw (A1) for clearest sound and sharpest detail in the picture.
Check any other high channels (7-13) receivable in that area and make slight compromise adjustment of A1 if necessary for best reception on all high band channels. For low band channels (2-6) set station selector switch to channel nearest channel 6 and adjust the slotted brass screw (A2) for clearest sound and sharpest detail in the picture.
Check any other low channels (2-6) receivable in that area and make slight compromise adjustment of A2 if necessary for best reception on all low band channels.

VHF RF AND MIXER ALIGNMENT FOR TUNER 159023-1 USED IN CHASSIS 431-4.

The RF and Mixer portion of this receiver has been properly aligned at factory and is very stable. Alignment of this portion should not be required in the field.

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

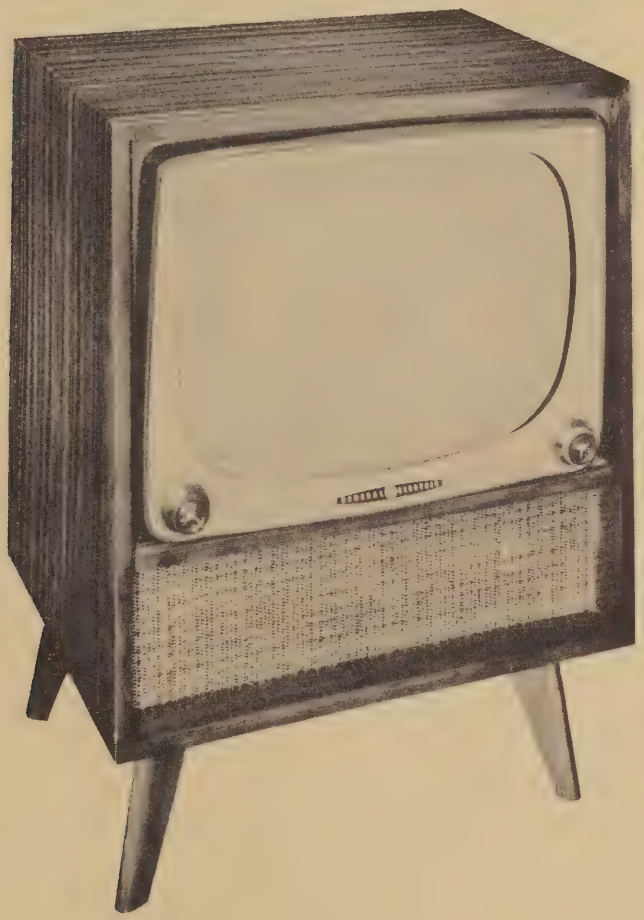
GENERAL ELECTRIC MODELS 21C106, 21C107, 21C108, 21C109, 21T32 21T33, 21T36, 21T37 ("N" Line)

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

PROPERTY OF
OWENSHIP
EADE ST.
COLORADO



MODEL 21C106

GENERAL ELECTRIC MODELS 21C106, 21C107, 21C108, 21C109, 21T32 21T33, 21T36, 21T37 ("N" Line)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

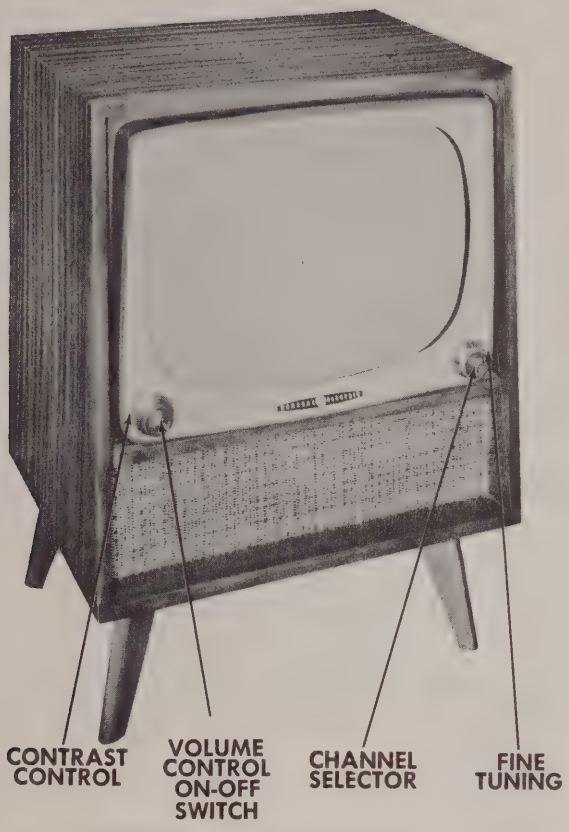
"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 11–55 SET 297 FOLDER 2

PHOTOFACT* Folder
*TRADE MARK

GENERAL ELECTRIC MODELS 21C106, 21C107, 21C108, 21C109, 21T32 21T33, 21T36, 21T37 ("N" Line)

PROPERTY OF
L. F. PLAINSHIP
DENVER, COLORADO



GENERAL ELECTRIC MODEL 21C106

TRADE NAME	General Electric Models 21C106, 21C107, 21C108, 21C109, 21T32, 21T33, 21T36, 21T37 ("N" Line)
MANUFACTURER	General Electric Co., Electronics Dept., Electronics Park, Syracuse, N.Y.
TYPE SET	Television Receiver
TUBES	Fifteen
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING 1.38 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

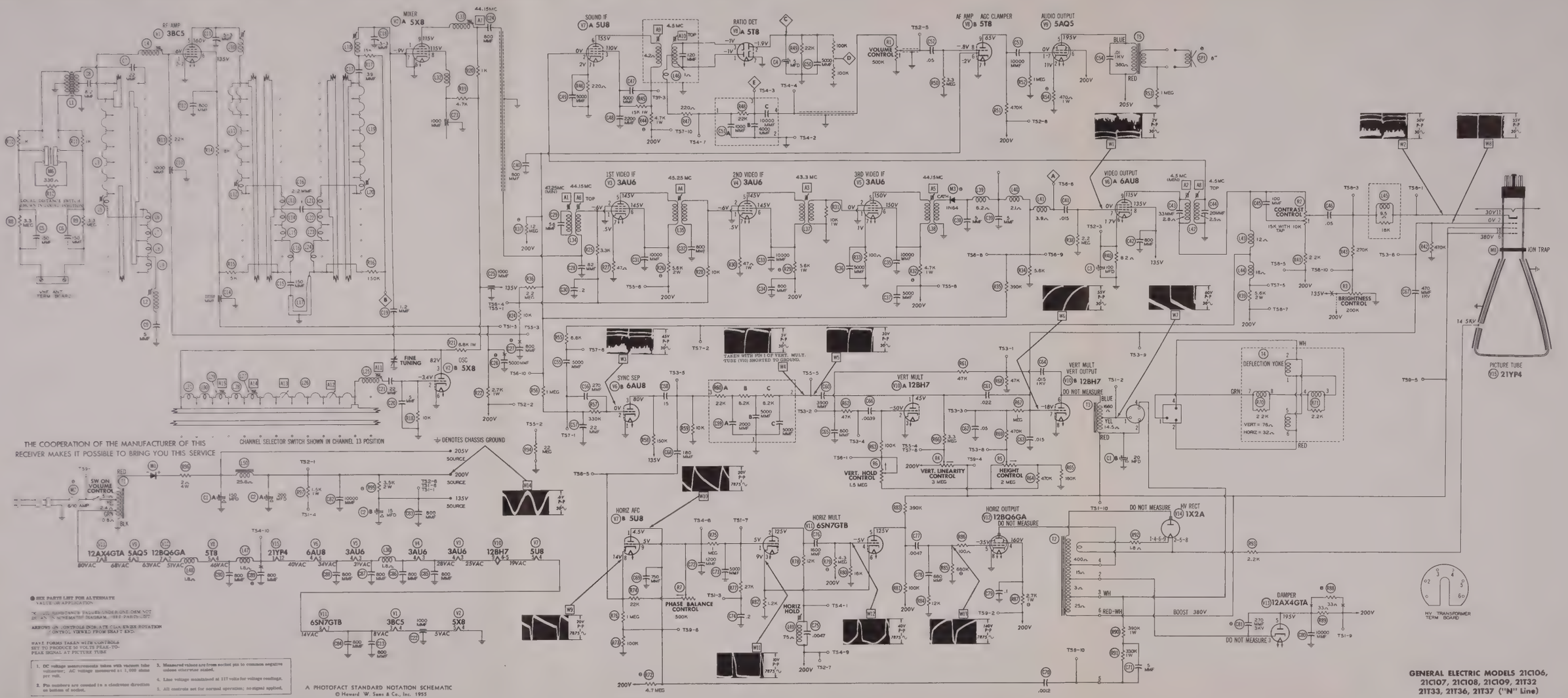
INDEX

Alignment Instructions 6, 7
Drive Cord Stringing 17
Disassembly Instructions 18
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions 14, 15, 16
Photographs
Cabinet-Rear View 11
Capacitor Identification 4, 9
Chassis-Top View 3
RF Tuner 10
Resistor Identification 19, 20
Photographs (Cont)
Trans., Inductor & Alignment Identification 3
Resistance Measurements 8
Servicing in the Field 18
Schematic (Alternate Tuner) 13
Schematic (TV) 2
Terminal Location Chart 17
Trouble Shooting Aids 12, 17
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

GENERAL ELECTRIC MODELS 21C106, 21C107, 21C108, 21C109, 21T32 21T33, 21T36, 21T37 ("N" Line)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

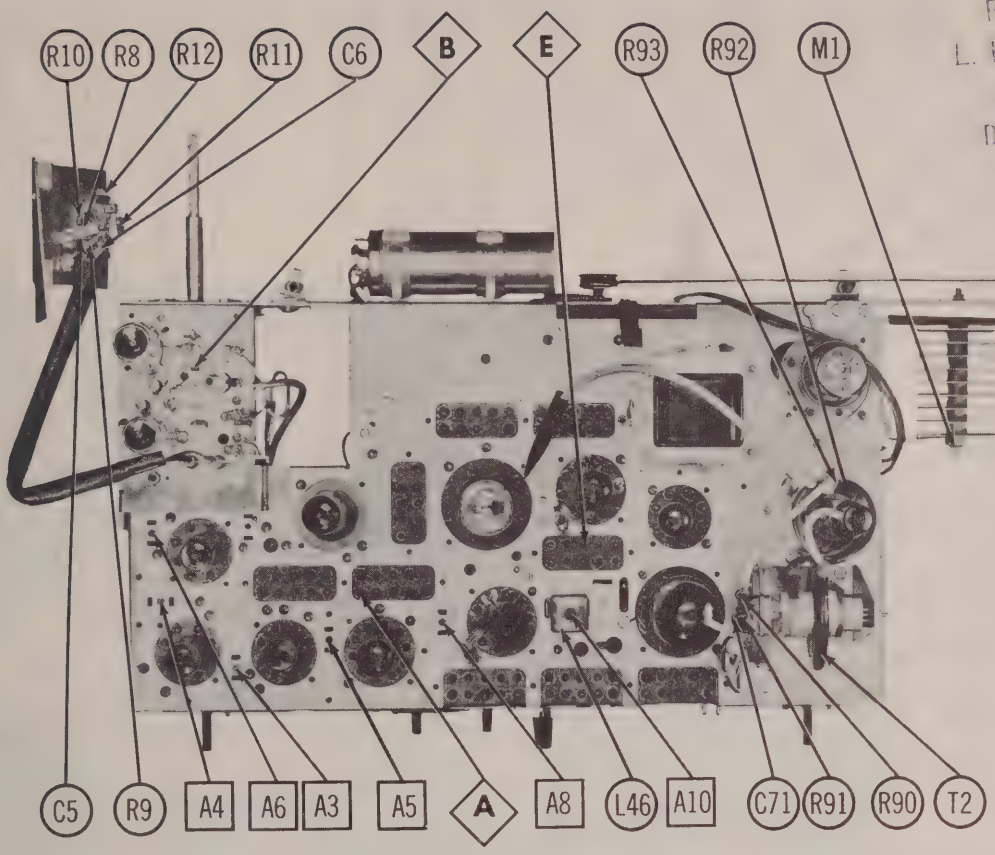
"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America


RF AMP V1 3BC5
MIXER V2A 5X8
OSC V2B 5X8
SOUND IF V7A 5U8
RATIO DET V8A 5T8
AF AMP AGC CLAMPER V9B 5T8
AUDIO OUTPUT V9 5AQ5
1ST VIDEO IF V3 3AU6
2ND VIDEO IF V4 3AU6
3RD VIDEO IF V5 3AU6
VIDEO OUTPUT V6A 6AU8
SYNC SEP V6B 6AU8
VERT MULT V10A 12BH7
VERT MULT VERT OUTPUT V10B 12BH7
HORIZ AFC V7B 5U8
HORIZ MULT V11 6SN7GTB
HORIZ OUTPUT V12 12BQ6GA
HV RECT V14 1X2A
DAMPER V13 12AX4GTA
PICTURE TUBE V15 21YP4
VOLUME CONTROL 500K
CONTRAST CONTROL 15K WITH 10K TAP
BRIGHTNESS CONTROL 200K
FINE TUNING
VERT. HOLD CONTROL 1.5 MEG
VERT. LINEARITY CONTROL 3 MEG
HEIGHT CONTROL 2 MEG
PHASE BALANCE CONTROL 500K
HORIZ HOLD 75K
SW ON VOLUME CONTROL
ION TRAP
DEFLECTION YOKE
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
DENOTES CHASSIS GROUND
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
12AX4GTA 5AQ5 12BQ6GA 5T8 21YP4 6AU8 3AU6 3AU6 3AU6 12BH7 5U8
6SN7GTB 3BC5 5X8
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

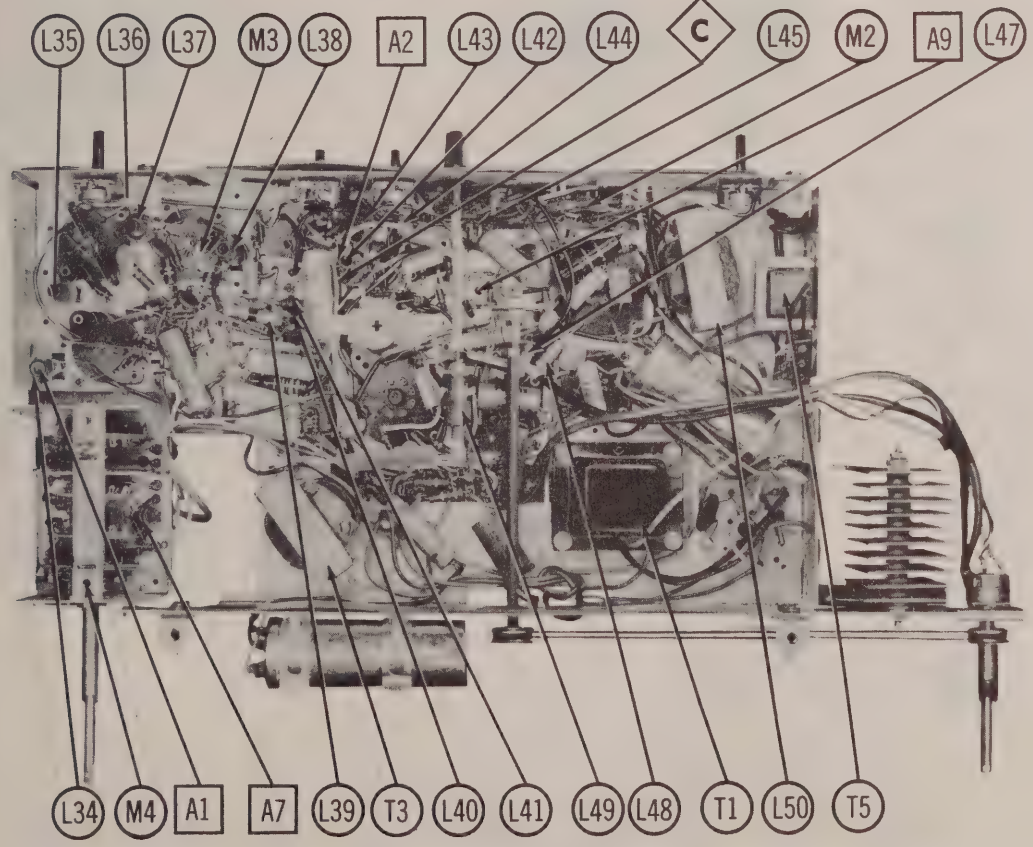
GENERAL ELECTRIC MODELS 21C106, 21C107, 21C108, 21C109, 21T32, 21T33, 21T36, 21T37 (Ch. "N" Line)

GENERAL ELECTRIC MODELS 21C106, 21C107, 21C108, 21C109, 21T32, 21T33, 21T36, 21T37 ("N" Line)

PROPERTY OF
L. F. BLANKENSHIP
DENVER, COLORADO

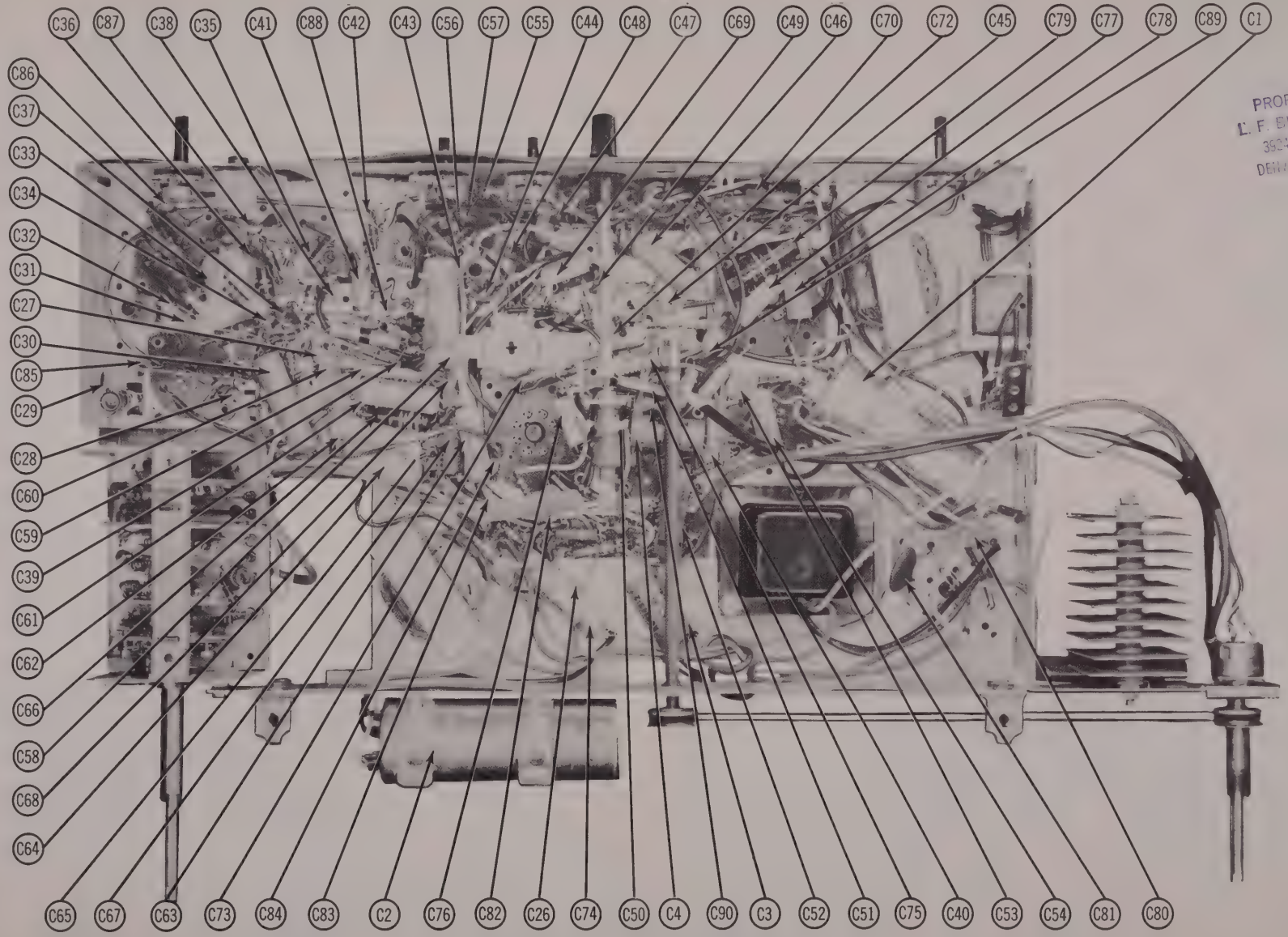


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

SET 297 FOLDER 2

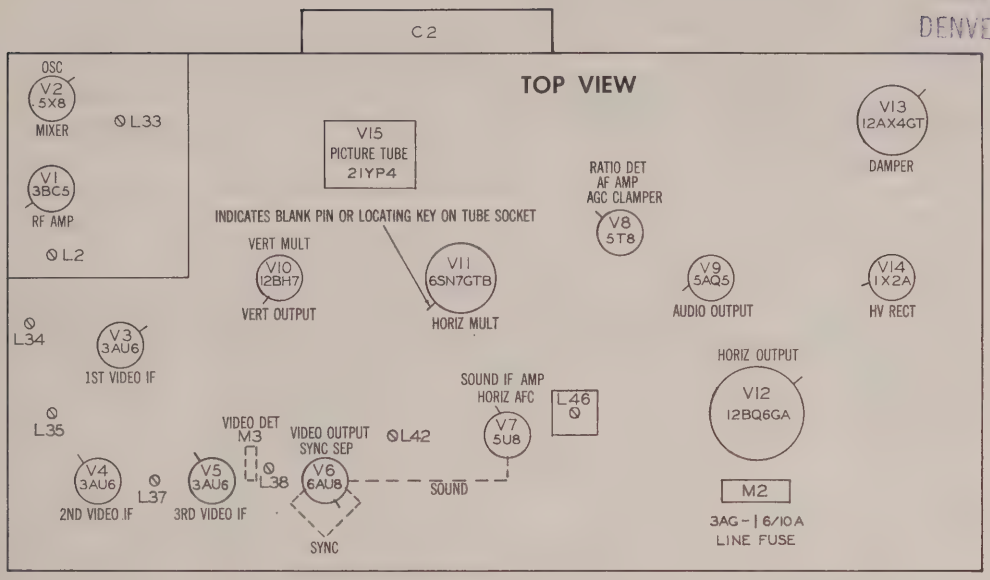


PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST
DENVER, COLORADO



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

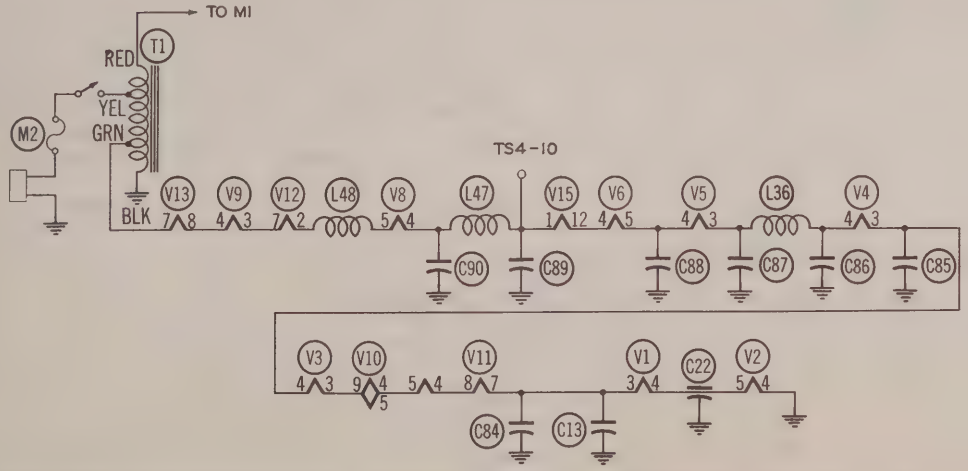
POWER SUPPLY FAILURE
No raster, no sound - Selenium Rectifier (M1) Fuse (M2)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster -V6, V15
Has pic, no sound -V7, V8, V9
Overloaded picture - V8

SYNC FAILURE
No vert. sync - V6, V10
No horiz. sync - V6, V7, V11
No vert. or horiz. sync -V6

SWEEP FAILURE
No raster, has sound - V11, V12, V13, V14, V15
No vertical deflection -V10
Poor vert. linearity or foldover -V10
Poor horiz. linearity or foldover - V11, V12, V13
Narrow picture - V11, V12, V13, M1
Vert. off freq. -V6, V10
Horiz. off freq. - V6, V7, V11

Note: Since this receiver employs tubes used in a series-parallel filament network, an open filament in any tube in series may cause the set to be inoperative. (See circuit below).



ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
The high voltage lead should be securely taped and kept away from chassis.
Allow a 20 minute warm-up period for receiver and test equipment.
Picture tube and yoke are connected during alignment.

TRAP ALIGNMENT

Turn the contrast control for maximum contrast.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to point Ⓑ. Low side to chassis.	Not used	47.25MC (400∿ Mod.)	11, 12 or 13	Vert. Amp. to pin 11 (cathode) of picture tube. Low side to chassis.	A1	Adjust for MINIMUM 400∿ indication on scope. If necessary use maximum scope gain.
2.	"	High side to point Ⓐ. Low side to chassis.	"	4.5MC (400∿ Mod.)	"	Vert. Amp. thru detector (Fig. 1) to pin 11 (cathode) of picture tube.	A2	"

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt bias supply to the ungrounded side of C30. Connect positive lead to chassis. If the receiver is known to be only slightly misaligned, omit "Video IF Alignment" and continue alignment as outlined under "Overall Video IF Response Check". Use only enough signal generator output to provide useable indication on VTVM. If during adjustment two peaks occur, the correct peak may be obtained by turning the slug fully counter clockwise, then clockwise until the first peak appears again.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
3.	.001MFD	High side to point Ⓑ. Low side to chassis.	43.3MC (Unmod)	11, 12 or 13	DC probe thru 10KΩ to point Ⓐ. Common to chassis.	A3	Adjust for maximum deflection.
4.	"	"	45.25MC	"	"	A4	"
5.	"	"	44.15MC	"	"	A5, A6, A7	"

OVERALL VIDEO IF RESPONSE CHECK

The channel selector switch should be set to channel 11, 12 or 13. Select the channel (11, 12 or 13) on which the response curve does not change shape when turning the fine tuning control. Calibrate oscilloscope so that 75 volts peak to peak produces 2 inches of vertical deflection.
Leave bias connected as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	.001MFD	High side to point Ⓑ. Low side to chassis.	44MC (10MC Swp.)	41.25MC 42.5MC 45.75MC 47.25MC	11, 12 or 13	Vert. Amp. thru 10KΩ to point Ⓐ. Low side to chassis.		Check for response curve similar to Fig. 2. Adjust A3 thru A7 for correct response curve with correct marker positions. Adjust A3 for correct position of 42.5MC marker and maximum amplitude of low frequency side of response curve. Adjust A4 for positioning of 45.75MC marker. Adjust A5 and A6 for correct tilt at peak region of response curve. Adjust A7 for width of peak region of the response curve. Increase the sweep generator output and check 47.25MC and 41.25MC Trap markers for correct position on response curve (Fig. 2).

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point Ⓒ to chassis. The junction of these two resistors is alignment point Ⓓ as shown on the schematic.
If a signal generator providing a 4.5MC signal of crystal accuracy is not available, restore the receiver to normal operating condition and tune in a TV station.
Connect VTVM and adjust A8, A9 and A10 as in steps 7 and 8.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.01MFD	High side to point Ⓐ. Low side to chassis.	4.5MC (Unmod)	Any unused channel	DC probe to point Ⓒ. Common to chassis.	A8, A9	Adjust for maximum deflection.
8.	"	"	"	"	DC probe to point Ⓔ. Common to point Ⓓ.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Repeat steps 7 and 8.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.01MFD	High side to point Ⓐ. Low side to chassis.	4.5MC (450KC Swp.)	4.5MC	Any unused channel	Vert. Amp. to point Ⓒ. Low side to chassis.	A8, A9	Disconnect stabilizing capacitor C4. Adjust for curve of maximum amplitude and symmetry similar to Fig. 3.
8.	"	"	"	"	"	Vert. Amp. to point Ⓔ. Low side to chassis.	A10	Reconnect stabilizing capacitor C4. Adjust so that 4.5MC occurs at center of cross-over lines as in Fig. 4. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.

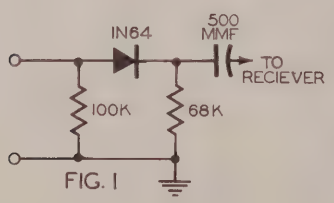


FIG. 1

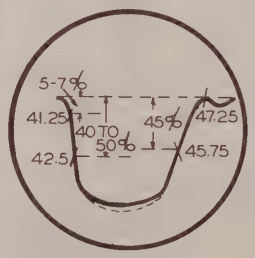


FIG. 2

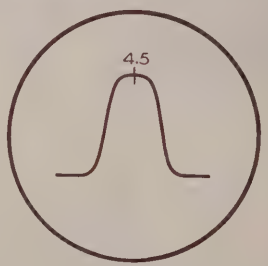


FIG. 3

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Connect bias as under "Video IF Alignment."
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω Resistors	Across antenna terminals with 120Ω in each lead. Use very short leads.	213MC (10-15MC Swp.)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A11	Adjust so that video marker falls at 50% on response curve as in Fig. 5. Sound marker should fall in trap notch.
10.	"	"	207MC (10-15MC Swp.)	205.25MC 209.75MC	12	"		Check for response similar to Fig. 5. If necessary make compromise adjustment of A-11 for channel 12 and channel 13.
11.	"	"	201MC (10-15MC Swp.)	199.25MC 203.75MC	11	"	A12	Adjust so that video marker falls at 50% on response curve as in Fig. 5. Sound marker should fall in trap notch.
12.	"	"	195MC (10-15MC Swp.)	193.25MC 197.75MC	10	"		Check for response similar to Fig. 5. If necessary make compromise adjustment of A12 for channel 10 and 11.
13.	"	"	189MC (10-15MC Swp.)	187.25MC 191.75MC	9	"	A13	Adjust on channel 9 so that video marker falls at 50% on response curve as in Fig. 5. Sound marker should fall in trap notch. Check for response similar to Fig. 5 on channels 7 and 8. If necessary make compromise adjustment of A13 for channels 7, 8 and 9.
			183MC (10-15MC Swp.)	181.25MC 185.75MC	8			
			177MC (10-15MC Swp.)	175.25MC 179.75MC	7			
14.	"	"	85MC (10-15MC Swp.)	83.25MC 87.75MC	6	"	A14	Adjust so that video marker falls at 50% on response curve as in Fig. 5. Sound marker should fall in trap notch.
15.	"	"	79MC (10-15MC Swp.)	77.25MC 81.75MC	5	"		Check for response similar to Fig. 5. If necessary make compromise adjustment of A14 for channel 5 and 6.
16.	"	"	69MC (10-15MC Swp)	67.25MC 71.75MC	4	"	A15	Adjust on channel 4, so that video marker falls at 50% on response curve as in Fig. 5. Sound marker should be in trap notch. Check for response similar to Fig. 5 on channels 2 and 3. If necessary make compromise adjustment of A15 for channels 2, 3 and 4.
			63MC (10-15MC Swp)	61.25MC 65.75MC	3			
			57MC (10-15MC Swp)	55.25MC 59.75MC	2			

RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

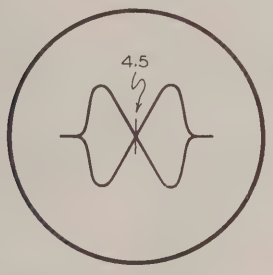


FIG. 4

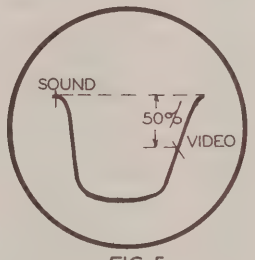
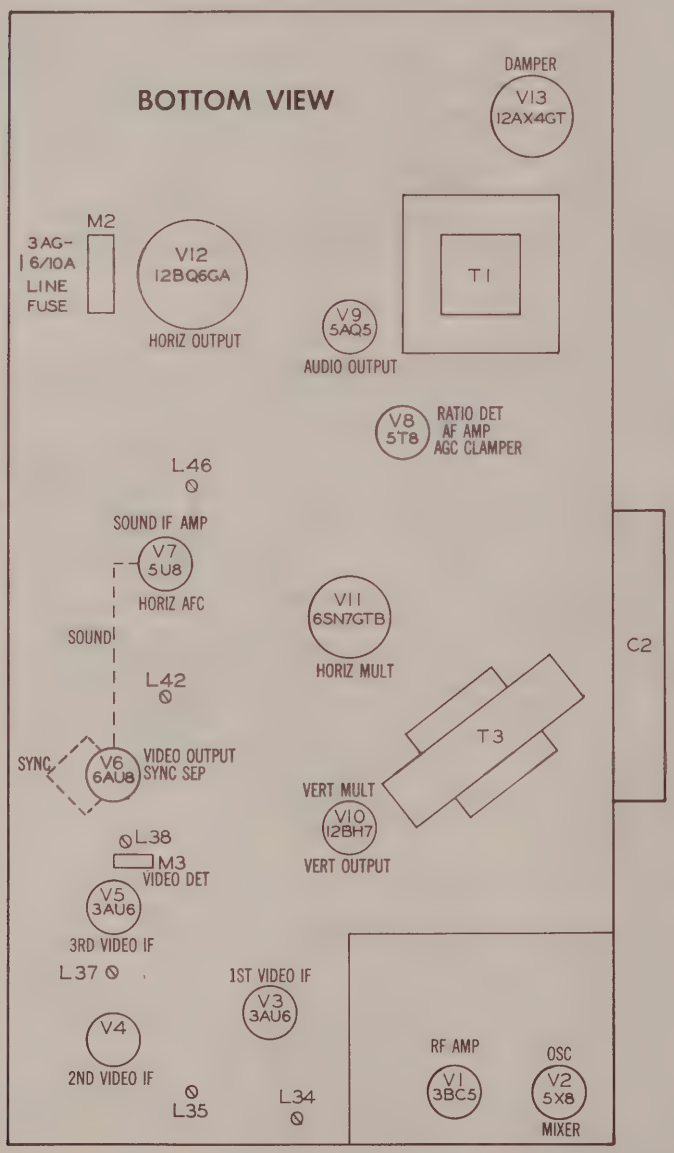


FIG. 5

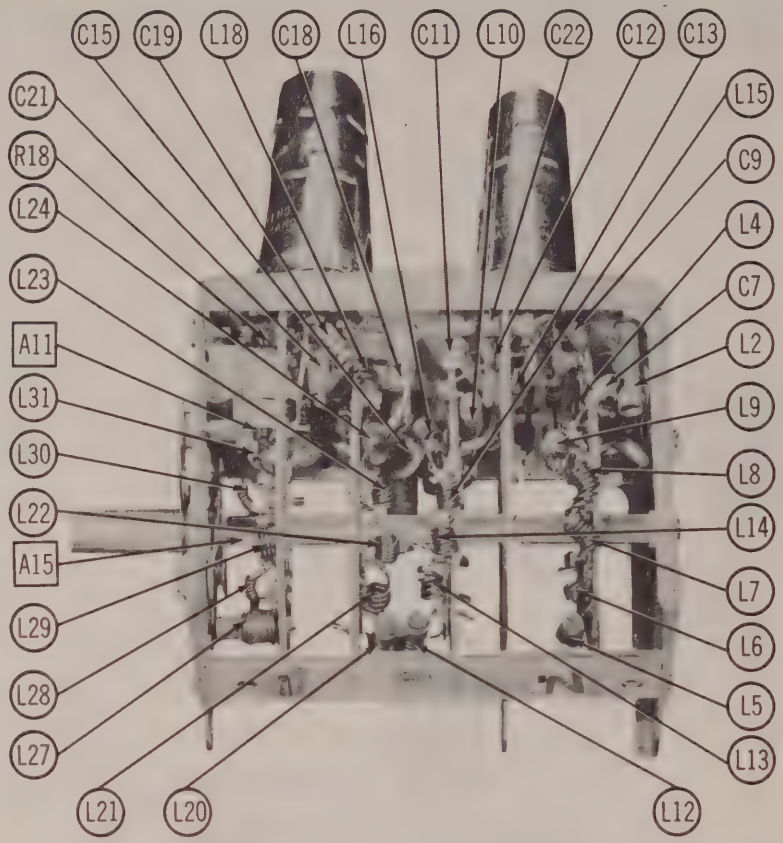
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	3BC5	2. 6Meg	0Ω	2Ω	1Ω	†4. 2KΩ	†18KΩ	0Ω		
V 2	5X8	0Ω	10KΩ	†10KΩ	0Ω	1Ω	0Ω	165KΩ	†8. 2KΩ	†4. 5KΩ
V 3	3AU6	2. 6Meg	0Ω	5. 5Ω	6Ω	†5. 6KΩ	†5. 6KΩ	47Ω		
V 4	3AU6	2. 6Meg	0Ω	6Ω	6. 5Ω	†5. 6KΩ	†5. 6KΩ	47Ω		
V 5	3AU6	. 1Ω	0Ω	7. 5Ω	8Ω	†4. 7KΩ	†4. 7KΩ	100Ω		
V 6	6AU8	0Ω	1. 8Meg	†150KΩ	8. 5Ω	8Ω	82Ω	2. 2Meg	†3. 5KΩ	†4. 8KΩ
V 7	5U8	100KΩ	2. 5Ω	†20KΩ	3. 3Ω	4. 2Ω	†4. 7KΩ	220Ω	1. 1Meg	1. 4Meg
V 8	5T8	INF.	22KΩ	Inf.	9Ω	9Ω	390KΩ	0Ω	3. 3Meg	†470KΩ
V 9	5AQ5	1Meg	470Ω	9Ω	8. 5Ω	†360Ω	†26Ω	1Meg		
V 10	12BH7	▲5Meg	1Meg	0Ω	4. 2Ω	4. 2Ω	▲1. 7KΩ	2Meg	0Ω	5. 5Ω
V 11	6SN7GTB	2. 5Meg	†12KΩ	1. 2KΩ	16KΩ	†100KΩ	1. 2KΩ	2Ω	3. 3Ω	
V 12	12BQ6G	TP	9Ω	TP	†2. 7KΩ	680KΩ	TP	9Ω	0Ω	TOP CAP ▲15Ω
V 13	12AX4GTA	TP	NC	360KΩ	NC	†46Ω	NC	7. 5Ω	8. 5Ω	
V 14	1X2A		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲415Ω
V 15	21YP4	9Ω	470KΩ	PIN 6 ▲17Ω	PIN 10 ▲17Ω	PIN 11 †400KΩ	PIN 12 8. 5Ω			

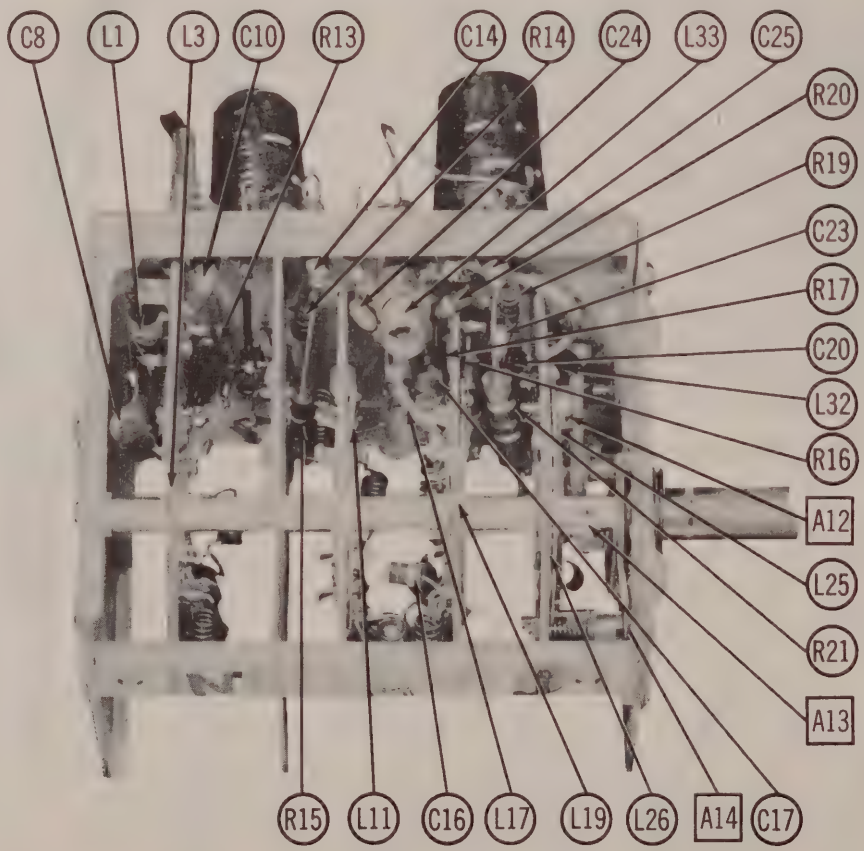
†MEASURED FROM OUTPUT OF MI.
▲MEASURED FROM PIN 3 OF V13.
TP-TIE POINT.
NC-NO CONNECTION.



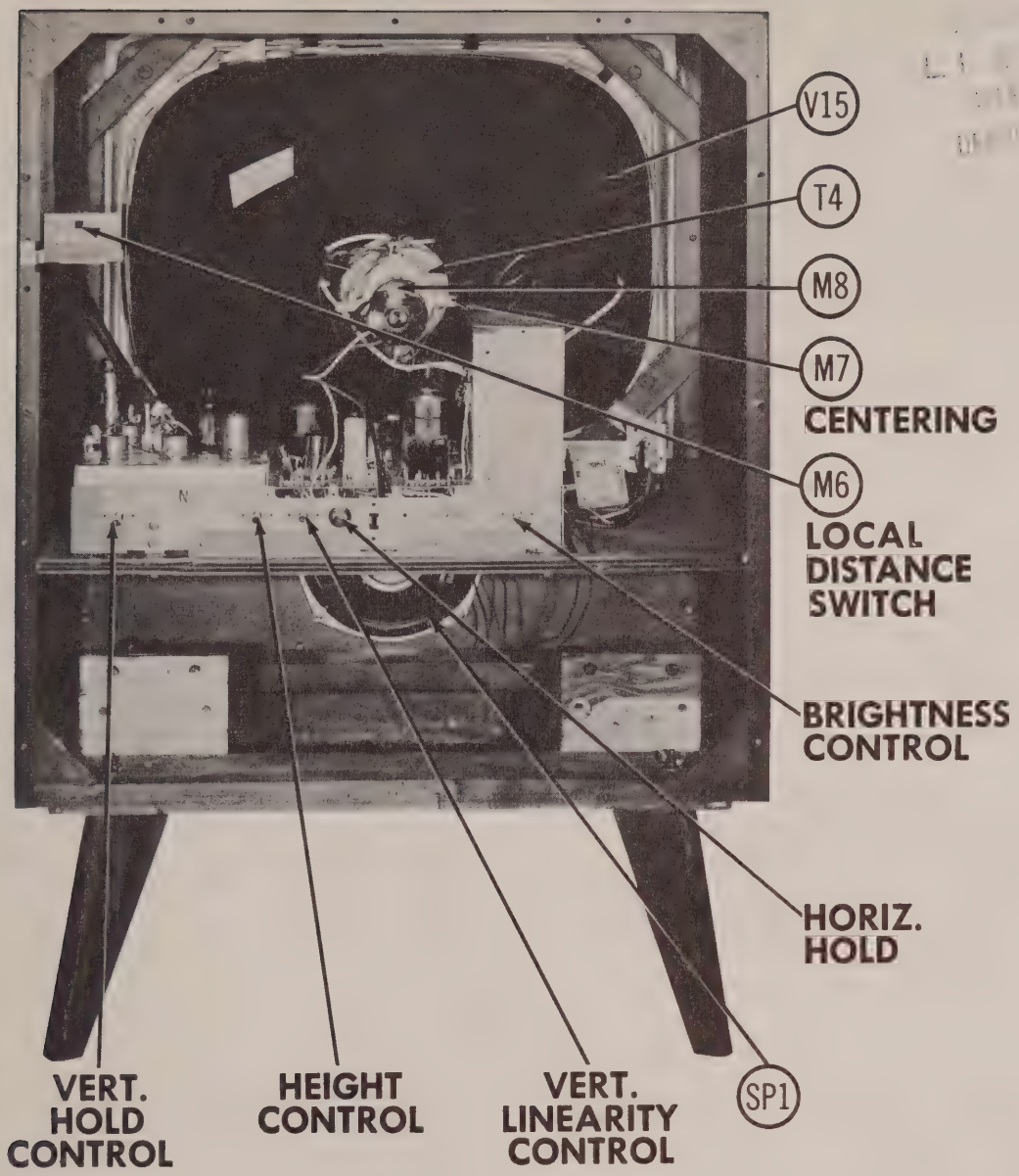
TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern. Connect a short clip lead across L49. Adjust the Phase Balance Control (R7) until the picture synchronizes horizontally. Remove short from L49 and adjust the horizontal hold (on rear panel) until picture again synchronizes horizontally. Check all available channels. If necessary, retouch horizontal hold.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V12 and V13. Check M1, R87, R96, T2, T4A, C77, C78 and other associated components.

DRIVE LINES

Check by substitution V12 and V13. Check C77, C78, R84, R87, T2, T4A and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V12 and V13. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V11, V12 and V13. Check C73 for open. Check L49, C72, C75, C74, R75 and other associated components.

XMAS TREE EFFECT

Check by substitution V11, V12 and V13. Check T2 and T4 for internal arcing. Check L49, C70, C69, C75, C76, R82, and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V10. Check waveform W6.

If Satisfactory	If Unsatisfactory
Check T3, T4B, C1B and other associated components.	Check C60, C61, C64, C66, R63, R66, R65 and other associated components.

INSUFFICIENT SWEEP

Substitute V10. Check height and vertical linearity controls for proper operation. Check other associated components.

COMPRESSED AT BOTTOM

Substitute V10. Check R69, R65, R5, C62 and other associated components.

COMPRESSED AT TOP

Substitute V10. Check R66, C61, C64, T3, T4B and associated components.

FOLDS

Substitute V10. Check C65, C66, R61, R68, T3, T4B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Substitute V6. Check C55, C56, C57, C58, R58 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V10. Check vertical integrator network. Check C60, C61, C65, R63, R6 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V7 and V11. Check C68, C69, C72, C73, L49, R75, R72, R73 and other associated components.

HORIZONTAL BENDING

Check by substitution V6, V7 and V11. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V6. Check C41, C42, C46, R40, R39, L43, L44 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A2. Check video IF alignment.

POOR CONTRAST

Substitute V6. Check R40, R39, L44, L45, C41, C46 and other associated components.

NEGATIVE PICTURE

Substitute V6. Check picture tube. Check C41, C46, L45, R39 and other associated components.

SMEAR

Substitute V6. Check L40, L41, L44, L45, C41, C46 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5 and V6 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V7, V8, and V9. Check stages V8 and V9 using audio signal generator. Apply audio signal across R1.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C51, C52, C53, C54, R51, R54, T5 speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A10 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or no Sound".

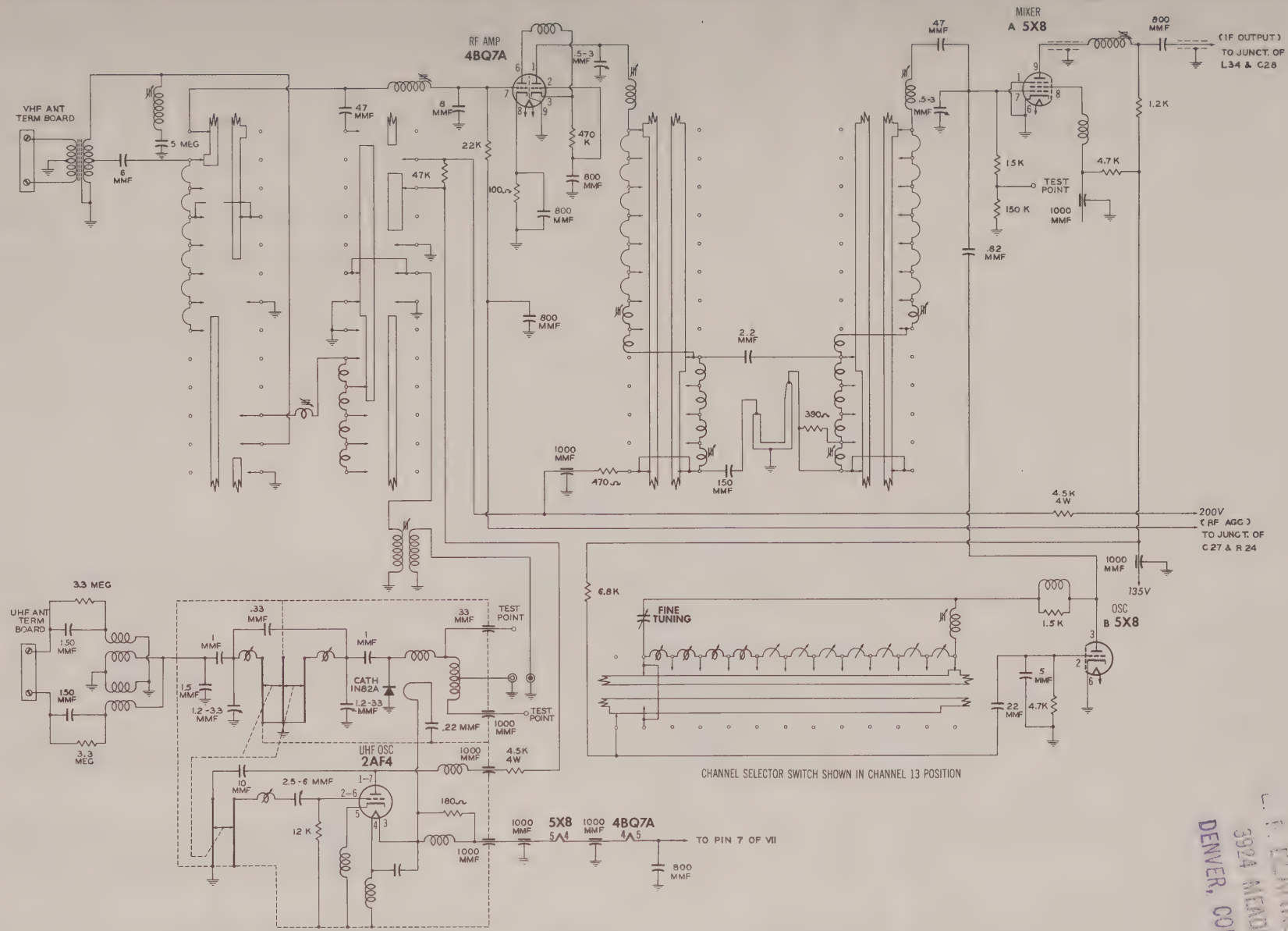
POWER

DEAD SET

If filaments fail to light, check all tubes. These tubes are connected in series. Check AC interlock assembly. Check switch on volume control and T1. Check fuse M2. If filaments light, check M1 and R96. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Check M1 and R96. Check B+ filter and decoupling network.


RF AMP 4BQ7A
MIXER A 5X8
OSC B 5X8
UHF OSC 2AF4
VHF ANT TERM BOARD
UHF ANT TERM BOARD
FINE TUNING
TEST POINT
(IF OUTPUT) TO JUNCT. OF L34 & C28
200V (RF AGC) TO JUNCT. OF C27 & R24
135V
TO PIN 7 OF VII
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION

A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1955

UHF TUNER PART NO. RUX-010, VHF TUNER PART NO. RJX-071 USED WITH UHF MODELS

UHF-VHF TUNER SCHEMATIC

L. F. ELMENHORST
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: General Electric PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	3BC8	3BC8	TBD	
V2	Mixer-Osc.	5X8	5X8	8AK	
V3	1st. Video IF Amp.	3AU6	3AU6	7BK	
V4	2nd. Video IF Amp.	3AU6	3AU6	7BK	
V5	3rd. Video IF Amp.	3AU6	3AU6	7BK	
V6	Video Output-				
	Sync Separator	6AU8	6AU8	9DX	
V7	Sound IF Amp.-				
	Horiz. AFC	5U8	5U8	8AE	
V8	Ratio Det.-				
	AF Amp.-				
	AGC Clamper	5T8	5T8	8E	
V9	Audio Output	5AQ8	5AQ8	7BZ	
V10	Vert. Mult.-				
	Vert. Output	12BH7	12BH7	8A	
V11	Horiz. Mult.	6SN7GTB	6SN7GTB	8BD	
V12	Horiz. Output	12BQ6GA	12BQ6GA	8AM	
V13	Damper	12AX4GTA	12AX4GTA	6CQ	
V14	HV Rectifier	1X2A	1X2A	9Y	

CATHODE-RAY TUBE

ITEM No	REPLACEMENT DATA: General Electric PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V15	21YP4	21YP4	21YP4	21YP4	21YP4	12L	① Aluminized
	21YP4A ①	21YP4A ①	21YP4A ①	21YP4A ②	21YP4A ①	12L	② Silver screen

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: General Electric PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1A	▲150	250	RCE-309	FP31	TM-3033	8-160	
B	▲30	450		TC75		FM-4520	
C2A	▲300	250			TM-2033		
B	▲15	250					
C3	100	8	RCE-131	TC3501	TD-100-6	MTH-0610	
C4	5	50	RCE-174	TC30	TD-5-50	MMT-0505	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: General Electric PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C5	150	500		D6-151	GP2K-151	MC236	
C6	150	500		D6-151	GP2K-151	MC236	
C7	22			DD-220	831-220	UC-5422	
C8	5.3						
C9	5			TCZ-5	NP0A-050	ZT-555	
C10	1000						
C11	5-3			839-3	3115-01-CR5	CT565A	
C12	800			DD-801	831-801	DC-521	
C13	800			DD-801	831-801	DC-521	
C14	1000						
C15	150			DD-151	811-151	UC-5315	
C16	2.2			TC2-2R2	NP0A-2R2		
C17	39			DD-390	831-390	UC-5439	
C18	5-3			839-3	3115-01-CR5	CT565A	
C19	1.2						
C20	5						
C21	22			TCA-22			
C22	1000						
C23	1000						
C24	800			DD-801	831-801	DC-521	
C25	1000						
C26	5000			DD-502	811-005	DC-525	Note 1
C27	800		RCW-3037	DD-801	831-801	DC-521	Note 1
C28	82		N-RCW-3183	D6-820	GP1K-820		
C29	56			TCZ-56	NP0-337-560		
C30	.5	200	UCC-014			PT402	
C31	10000		N-RCW-3186	DD-103	811-01	DC-511	
C32	800		RCW-3037	DD-801	831-801	DC-521	
C33	10000		N-RCW-3186	DD-103	811-01	DC-511	
C34	800		RCW-3037	DD-801	831-801	DC-521	
C35	10000		N-RCW-3186	DD-103	811-01	DC-511	
C36	5000		RCW-3014	DD-502	811-005	DC-525	
C37	5000			DD-502	811-005	DC-525	
C38	5		RCW-3113	TCZ-5	NP0A-050	ZT-555	
C39	5		RCW-3113	TCZ-5	NP0A-050	ZT-555	
C40	800		RCW-3037	DD-801	831-801	DC-521	
C41	.015	100	RCN-042	DD16-153		DT6115	
C42	800		RCW-3037	DD-801	831-801	DC-521	
C43	33		RCW-3169	NP0L-330	ZT-5433		
C44	20		RCW-3173	TCZ-20	NP0K-200	ZT-542	
C45	100		N-RCW-3181	D6-101	GP1K-101	UC-531	
C46	.05	400	RCC-079	DF-503		PT415	
C47	5000		RCW-3014	DD-502	811-005	DC-525	
C48	2200		N-RCW-3181	D6-222	GP2-333-222	UC-5222	
C49	5000		RCW-3014	DD-502	811-005	DC-525	
C50	5000		RCW-3014	DD-502	811-005	DC-525	
C51A	1000			DD-102	801-001	DC-521	
B	4000		†REK-005	D6-402	811-004	UC-524	
C	10000			DD-103	811-01	DC-511	
C52	.05	400		DF-503		PT415	
C53	10000		N-RCW-3186	DD-103	811-01	DC-511	
C54	.01	1000		DD-103		PT1611	
C55	5000		RCW-3014	DD-502	811-005	DC-525	
C56	270		RCW-3093	D6-271	GP2K-271	UC-5327	
C57	22		N-RCW-3179	TCZ-22	NP0K-220	ZT-5422	
C58	.15	400	UCC-049			PT4015	
C59A	2000					DC-522	
B	5000		◆REK-001	◆PC-100	▲1405-01	DC-525	
C	5000					DC-525	
C60	3900		N-RCW-3185			MCB463	

CAPACITORS (cont)

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: General Electric PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C61	.023	600	RCN-050	DF-303	817-02	PT6122	
C62	.05	200	N-RCC-086	DF-503		PT415	
C63	.015	600	N-RCN-103	DD16-153		PT6115	
C64	.015	1000	N-RCN-105	DD16-153		PT16115	
C65	800		N-RCW-3184	DD-801	831-801	DC-521	
C66	.0039	600	RCN-034			MCB463	
C67	470	1000	RCW-3097	DD-471	1K5KV-471	MCL347	
C68	180		N-RCW-3180	TCN-180	N750-337-181		
C69	750	500	RCU-240				
C70	.0012	600	N-RCC-115				
C71	5			TCZ-5	NP0A-050	ZT-555	
C72	1200		N-RCW-3187				
C73	5000		N-RCW-3188	DD-502	811-005	DC-525	
C74	.2	200	UCC-014			PT402	
C75	.0047	600	RCN-033			MCB465	
C76	1800	500	N-RCU-341				
C77	.0047	500	RCN-051	D6-472	GP2-333-472	PT6247	
C78	680	500	UCU-2048	D6-681	811-681		
C79	.1	400		DF-104		PT401	
C80	10000			DD-103	811-01	DC-511	
C81	270	3000		DD30-271	3KV-271		Note 2
C82	10000			DD-103	811-01	DC-511	
C83	800		RCW-3037	DD-801	831-801	DC-521	
C84	800		RCW-3037	DD-801	831-801	DC-521	
C85	800		RCW-3037	DD-801	831-801	DC-521	
C86	800		RCW-3037	DD-801	831-801	DC-521	
C87	800		RCW-3037	DD-801	831-801	DC-521	
C88	800		RCW-3037	DD-801	831-801	DC-521	
C89	800		RCW-3037	DD-801	831-801	DC-521	Note 1
C90	800		RCW-3037	DD-801	831-801	DC-521	

Note 1. Not used in some versions.
Note 2. Some versions use 300MMF in this application (part #N-RCW-3183).
† Items C51A, C51B, C51C, R48 are combined in one unit.
◆ Items C58A, C59B, C59C, R60A, R60B, R60C are combined in one unit.

CONTROLS

ITEM No	RATING: RESIST. ANCE	RATING: WATTS	REPLACEMENT DATA: General Electric PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	N-RRC-312			AB-58		Volume
B	Shaft		Not Req.			AK-25		Attach to R1A and AK-16 Coupler.
C	Coupler					AK-16		Cut off original shaft and attach coupler.
D	Switch					KB-1		Attach to R1B.
R2	1500Ω	½	N-RRC-319					Contrast (Tap at 10KΩ)
R3A	200KΩ	½	N-RRC-318	QU-129	A47-200K-S	AB-46		Brightness
B	Shaft		Not Req.	TQ	RN-3	AK-19		Attach to R3A.
R4A	3Meg	½	RRC-301	QU-140	A47-3Meg-S	BX-94	TAP356L	Vertical Linearity
B	Shaft		Not Req.	TQ	RN-3	Not Req.	Not Req.	Attach to R4A.
R5A	2Meg	½	RRC-311	QU-139	A47-2Meg-S	BX-75	TAP26L	Height
B	Shaft		Not Req.	TQ	RN-3	Not Req.	Not Req.	Attach to R5A.
R6A	1.5Meg	½	RRC-314	QU-138	A47-1.5Meg-S	AB-742	TAP25L	Vertical Hold
B	Shaft		Not Req.	TQ	RN-3	AK-19	Not Req.	Attach to R6A.
R7A	500KΩ	½	N-RRC-321	B11-133	A47-500K-S	BX-59	SU-50	Phase Balance
B	Shaft		Not Req.	TM-1 Kit	FKS-1/4	Not Req.	Not Req.	Attach to R7A.

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: General Electric PART No.	IRC PART No.	NOTES
R8	3.3Meg	½	URD-133	BTS-3.3Meg	
R9	3.3Meg	½	URD-133	BTS-3.3Meg	
R10	100Ω	½		BTS-1000	
R11	1000Ω	½		BTS-1000	
R12	330Ω	½	URD-037	BTS-330	
R13	22KΩ	½	URD-081	BTS-22K	
R14	18KΩ	½			
R15	1500Ω	½		BTS-1500	
R16	150KΩ	½	URD-101		
R17	15KΩ	½			
R18	10KΩ	½	URD-073		
R19	4700Ω	½			
R20	1000Ω	½			
R21	6800Ω	1		BTA-6800	
R22	2700Ω	1		BTA-2700	
R23	4500Ω	4			Note 1
R24	10KΩ	½	URD-073	BTS-10K	
R25	3300Ω	½	URD-081		
R26	5600Ω	2	URF-139		Note 2
R27	47Ω	½	URD-017	BTS-47	
R28	10KΩ	½	URD-073		
R29	9600Ω	1			Note 2
R30	47Ω	½	URD-017	BTS-47	
R31	10KΩ	1	URE-073		
R32	4700Ω	1			Note 3
R33	100Ω	½	URD-025	BTS-100	
R34	5600Ω	½	URD-067	BTS-5600	
R35	330KΩ	½	URD-111	BTS-330K	
R36	2.2Meg	½	URD-128	BTS-2.2Meg	
R37	12Meg	½		BTS-12Meg	Note 4
R38	2.2Meg	½	URD-129		
R39	5800	2	URF-139		
R40	82Ω	½	URD-023	BTS-82	
R41	22000Ω	½	URD-057	BTS-2200	
R42	470KΩ	½	N-URD-113		
R43	270KΩ	½	URD-107		
R44	4700Ω	1		BTA-4700	Note 5
R45	15KΩ	1	URD-077	BTA-15K	
R46	220Ω	½	URD-033	BTS-22	
R47	220Ω	½	URD-033	BTS-2	Note 9
R48	22KΩ	½	†REK-005	BTS	Note 11
R49	22KΩ	½	URD-081	PT	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: General Electric PART No.	IRC PART No.	NOTES
R50	3.3Meg	½	URD-133	BTS-3.3Meg	
R51	470KΩ	½	N-URD-113	BTS-470K	
R52	1Meg	½	URD-121	BTS-1Meg	
R53	1Meg	½	URD-121	BTS-1Meg	
R54	470Ω	1		BTA-470	Note 5
R55	6800Ω	½		BTS-6800	
R56	1Meg	½	URD-121		
R57	330K	½	URD-109		
R58	150K	½	URD-101		
R59	10KΩ	½	URD-073		
R60A	22KΩ	½			
B	8200Ω	½	◆REK-001		
C	6300Ω	½			
R61	47KΩ	½	URD-089		
R62	47KΩ	½	URD-089		
R63	100KΩ	½	URD-097		
R64	470KΩ	½	N-URD-113		
R65	180KΩ	½	URD-103		
R66	3.3Meg	½	URD-133		
R67	1Meg	½	URD-121		
R68	47KΩ	½	URD-089		
R69	470KΩ	½	N-URD-113		
R70	2200Ω	½	URD-057		
R71	2200Ω	½	URD-057		
R72	4.7Meg	½	URD-137		Note 6
R73	100KΩ	½	URD-097		
R74	22KΩ	½	URD-081		
R75	1Meg	½	URD-121		
R76	1Meg	½	URD-121		
R77	27KΩ	½	URD-083		
R78	12KΩ	½	URD-075		
R79	4.3Meg5%	½	URD-136		Note 7
R80	16KΩ5%	½			
R81	100KΩ	½	URD-097		
R82	120Ω	½	URD-051		
R83	390KΩ	½	URD-111		
R84	12KΩ	½	URD-075		
R85	680KΩ	½	URD-117		Note 8
R86	100Ω	½	URD-025		

RESISTORS (cont)

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: General Electric PART No.	IRC PART No.	NOTES
R90	390KΩ	1	URE-111		
R91	330KΩ	1	URE-109		
R92	1.8Ω	½		BTS-1.8	
R93	2200Ω	1	URD-057	BTS-2200	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: General Electric PART No.	IRC PART No.	NOTES
R94	22Meg	½		BTS-22Meg	
R95	3500Ω	2			Note 10
R96	2Ω	4		PW4-2	
R97	1500Ω	1		BTA-1500	

Note 1 Used with RJX-071 tuner only.
Note 2. A 33000 1W resistor is used in some versions.
Note 3. A 2200Ω 1W resistor is used in some versions.
Note 4. A 8.2Meg ½W resistor is used in some versions.
Note 5. A 330Ω ½W resistor is used in some versions.
Note 6 A 3.9Meg ½W resistor is used in some versions.
Note 7. A 4.7Meg ½W resistor is used in some versions.
Note 8. A 1Meg ½W resistor is used in some versions.
Note 9. A 1500Ω 1W resistor is used in some versions.
Note 10. A 1800Ω 2W (WW) resistor is used in some versions.
Note 11. In some versions a single 15Ω ½W resistor is used, in other versions 2-33Ω ½W resistors are used in parallel.
† Items C58A, C58B, C58C, R48 are combined in one unit.
◆ Items C59A, C59B, C59C, R60A, R60B, R60C are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	REPLACEMENT DATA: General Electric PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @1.38A	185VAC .260ADC tap @ 92VAC .6A		N-RTP-336 ①						

① Autotransformer.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: General Electric PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Horiz. Output Trans.	RTO-165, -1							
T3	Vert. Output Trans.	RTO-167	Z1804	A-3037	222T1	V313	A-8123	26S52	A-102X
T4A	Yoke-Horiz.(22MH)	RLD-068 ①							
B	Vert.(40MH)								

① Includes resistors R70 and R71.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: General Electric PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	4.6KΩ	3.4Ω	N-RTO-188	Z1107 ①	A-3026	A-3677 ①	24S51 ①	S-3X ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: General Electric PART No.	REPLACEMENT DATA: QUAM PART No.	NOTES
SP1	8"	PM	3.4Ω	N-S835D7	8A21	① Used in some versions.
	4"	PM	3.4Ω	N-S403D7 ①	4A07	

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: General Electric PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Trans.	.46CT	.1Ω ◆					◆ Tapped
L2	IF Trap	.3Ω						
L3	Ant. Coils	0Ω						Channels 7 thru 12
L4	Ant. Coil	0Ω						Channel 13
L5	Ant. Coil	0Ω						Channel 6
L6	Ant. Coil	0Ω						Channel 5
L7	Ant. Coil	0Ω						Channel 4
L8	Ant. Coil	0Ω						Channel 3
L9	Ant. Coil	0Ω						Channel 2
L10	RF Coil	0Ω						Channel 13
L11	RF Coils	0Ω						Channels 7 thru 12
L12	RF Coil	0Ω						Channel 6
L13	RF Coil	0Ω						Channel 5
L14	RF Coil	0Ω						Channel 4
L15	RF Coil	0Ω						Channel 3
L16	RF Coil	0Ω						Channel 2
L17	Hi-Band Coupling Strap	0Ω						
L18	Mixer Grid Coil	0Ω						Channel 13
L19	Mixer Grid Coils	0Ω						Channel 7 thru 12
L20	Mixer Grid Coil	0Ω						Channel 6
L21	Mixer Grid Coil	0Ω						Channel 5
L22	Mixer Grid Coil	0Ω						Channel 4
L23	Mixer Grid Coil	0Ω						Channel 3
L24	Mixer Grid Coil	0Ω						Channel 2
L25	Osc. Coil	0Ω						Channel 13
L26	Osc. Coils	0Ω						Channels 7 thru 12
L27	Osc. Coil	0Ω						Channel 6
L28	Osc. Coil	0Ω						Channel 5
L29	Osc. Coil	0Ω						Channel 4
L30	Osc. Coil	0Ω						Channel 3
L31	Osc. Coil	0Ω						Channel 2
L32	RF Choke	0Ω						
L33	Conv. Plate	.1Ω						
L34	Int. Video IF	.1Ω		RLL-319	17-4503 ◆	TV-134 ◆	6232 ◆	Includes 47.25MC trap- Note 1
L35	2nd. Video IF	.1Ω	.1Ω	RTL-178	17-4534 ◆	TV-136 ◆	6319 ◆	Note 1

"N-" PREFIX TO GENERAL ELECTRIC PART NO. DENOTES NEW PART.

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA General Electric PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L36	Fil. Choke	1.8Ω		RLI-085	19-1002		4606	2.2 Microhenries, IRC part #CLA
L37	3rd. Video IF	.1Ω	.1Ω	RTL-175	17-4524 *	TV-130 *	6219 *	Note 1
L38	4th. Video IF	.1Ω	.1Ω	RTL-176	17-4524 *	TV-130 *	6219 *	Note 1
L39	Series Peaking Coil	8.2Ω		RLI-153	19-1005			10 Microhenries, IRC part #CL-1
L40	Series Peaking Coil	2.1Ω		RLF-024	19-3036	TV-180	6176	31 Microhenries
L41	Series Peaking Coil	3.9Ω			19-3100	TV-181	6112	100 Microhenries
L42A	4.5MC Trap	2.8Ω						
B	Sound IF	2.5Ω		RLI-320				Note 1
L43	Series Peaking Coil	12Ω		RLI-327	19-3660		6148	680 Microhenries
L44	Shunt Peaking Coil	16Ω						1200 Microhenries
L45	Series Peaking Coil	9.5Ω			19-3300 ▲	TV-190 ▲	6132 ▲	330 Microhenries, wound on 18KΩ resistor
L46	Ratio Det.	4.2Ω	1ΩCT	RTO-019	17-3497	TV-115	6205	Tertiary winding -.4Ω
L47	Fil. Choke	1.8Ω		RLI-085	19-1002		4606	2.2 Microhenries, IRC part #CLA
L48	Fil. Choke	1.8Ω		RLI-085	19-1002		4606	2.2 Microhenries, IRC part #CLA
L49	Horiz. Osc.	75Ω		RLI-320	19-1576 ♦	TV-163 ♦	6210 ♦	

Note 1. Core part #REI-052.
* Drill mounting hole.
■ Drill mounting hole and use one winding.
▲ Parallel with 18KΩ resistor.
♦ Enlarge mounting hole.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA General Electric PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L50	.250ADC	25.6Ω	1.18Hy	N-RLF-070				26C44	C-23X

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	REPLACEMENT DATA General Electric PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	.260ADC	N-RER-019	1397A	9RS-300				

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA General Electric PART No. FUSE	General Electric PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M2*	3AG P/T S/B	1 6/10A	N-REF-020		31501.6 (3AG S/B P/T 1 6/10A)		MDV 1 6/10	
	3AG P/T S/B	2A			315002 (3AG S/B P/T 2A)		MDV2	

*Some versions may use a 2A fuse.

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA General Electric PART No.	REPLACEMENT DATA SYLVANIA PART No.	NOTES
M3	1N64*	RED-001	1N60 or 1N132	Video Det.

*Some versions may use crystal diode type 1N87 in this application.

MISCELLANEOUS

ITEM No.	PART NAME	General Electric PART No.	NOTES
M4	Tuner	RJX-070	VHF-VHF Models only.
	Tuner	RJX-071	VHF-VHF-UHF Models
M5	Tuner	RUX-010	UHF-VHF-UHF Models
M6	Switch	RSW-067	Local-Distant (DPDT-Slidetype)
M7	Centering Device	REA-008	
M8	Ion Trap	RET-013	
	Cabinet	N-RAV-266	Model 21C106
	Cabinet	N-RAV-267	Model 21C107
	Knob	N-RDK-403	Contrast-Models 21T32, 21T33
	Knob	N-RDK-468	Contrast-Models 21C106, 21C107
	Knob	N-RDK-404	On-Off-Volume-Model 21T32
	Knob	N-RDK-423	On-Off-Volume-Model 21T33
	Knob	N-RDK-467	On-Off-Volume-Models 21C106, 21C107
	Knob	N-RDK-439	VHF Selector-Model 21T33
	Knob	N-RDK-469	VHF Selector-Models 21C106, 21C107
	Knob	N-RDK-455	VHF Selector-Model 21T32
	Knob	N-RDK-457	VHF Tuning-Models 21T32, 21T33
	Knob	N-RDK-470	VHF Tuning-Models 21C106, 21C107
	Knob	N-RDK-472	Horiz. Hold
	Knob	N-RDK-459	UHF Dial-Models 21T32, 21T33
	Knob	N-RDK-471	UHF Dial-Models 21C106, 21C107
	Knob	N-RDK-460	UHF Tuning-Models 21T32, 21T33
	Safety Glass	N-RDN-088	Models 21T32, 21T33, 21C106, 21C107

"N-" PREFIX TO GENERAL ELECTRIC PART NO. DENOTES NEW PART.

TROUBLE SHOOTING AIDS (cont)

DENVER, COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V11, V12, V13 and V14. Check waveform W13.

If Satisfactory	If Unsatisfactory
Check T2, T4A, C79, C80, C81, R87 and other associated components.	Check L49, C75, C76, C77, R78, R81, R82 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V12 and V13. Check M1, R84, R87, R96, C77, C78, T2, T4A and other associated components.

BLOOMING

Check by substitution V12, V13, and V14. Check R87, R93, R96, C77, T2, T4A and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or no Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5 and V6. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

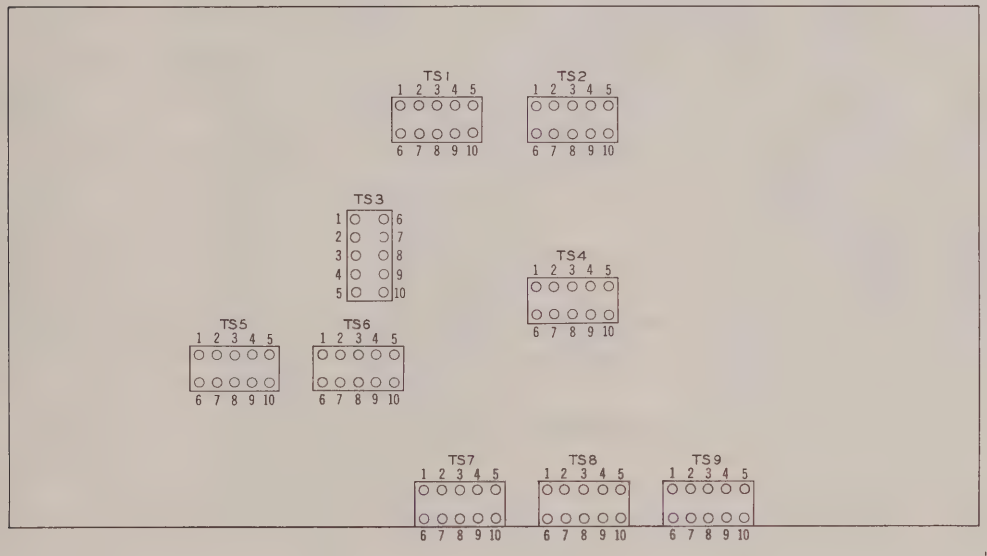
KEYSTONE EFFECT

Check T4 and its associated components.

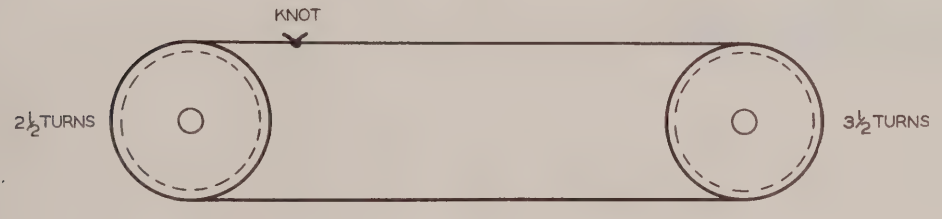
INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



TERMINAL LOCATION CHART



CONTRAST CONTROL DRIVE STRINGING
CONTRAST CONTROL FULLY COUNTER CLOCKWISE POSITION

DRIVE CORD STRINGING

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

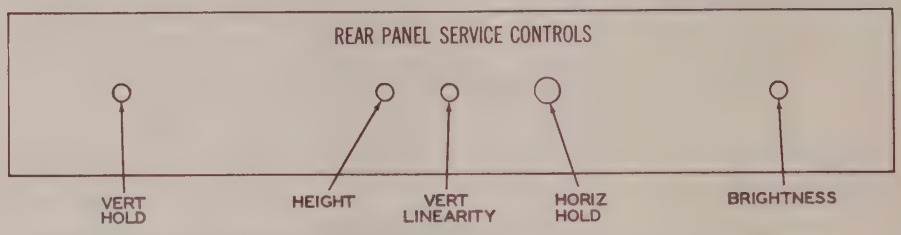
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 3 metal screws holding mask in cabinet, available from under wood panel at top of speaker baffle, Pull bottom of mask out and down to remove.

PICTURE TUBE REMOVAL

1. Remove 4 push-on type control knobs from front panel of cabinet.
2. Remove 8 metal screws. Remove rear cover.
3. Disconnect picture tube socket, yoke lead and HV lead.
4. Remove 3 metal screws holding mask (available from under wood panel of top of speaker baffle). Pull bottom of mask down to remove.
5. Remove 4 hex nuts holding strap assembly to cabinet. Remove picture tube and assembly.
6. Remove nut holding strap.
7. Remove Ion trap, centering magnet and yoke.

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from rear panel of chassis. Adjust the horizontal oscillator coil (L49) (labeled horizontal hold) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L48) located on top of chassis. (See tube placement chart).

FUSES

One fuse is used for LV power supply protection. (For location see tube placement chart).

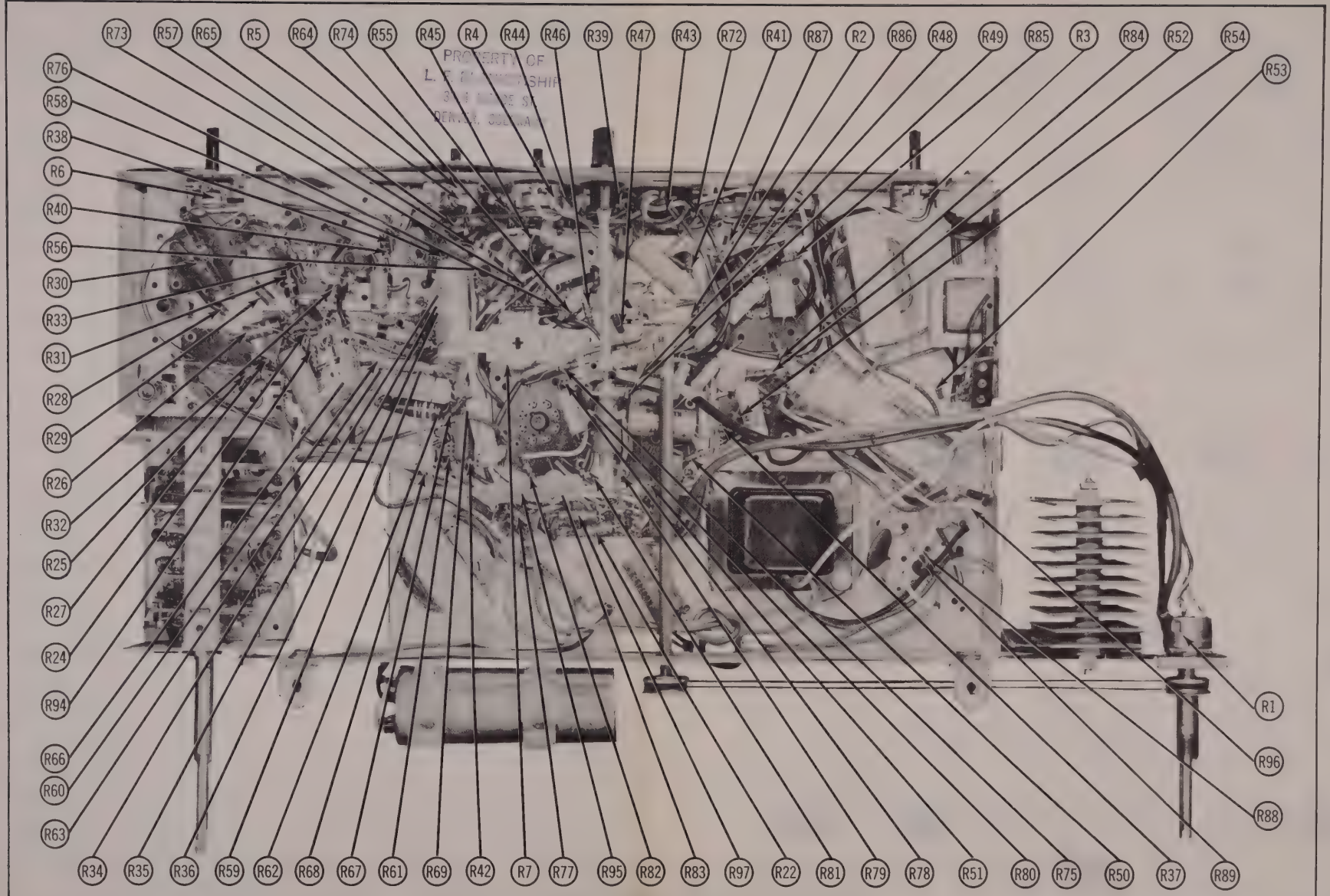
CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

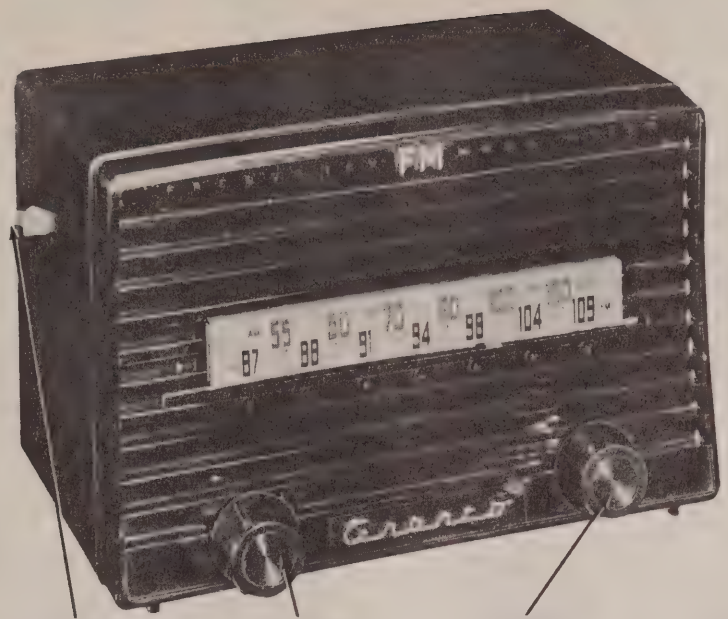
DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from front panel of cabinet.
2. Remove 8 metal screws. Remove rear cover.
3. Remove 1 metal screw. Remove antenna and switch bracket.
4. Disconnect speaker leads, picture tube socket, yoke lead and HV lead.
5. Remove 4 chassis bolts. Remove chassis.
6. Remove 4 speaker nuts. Remove speaker.

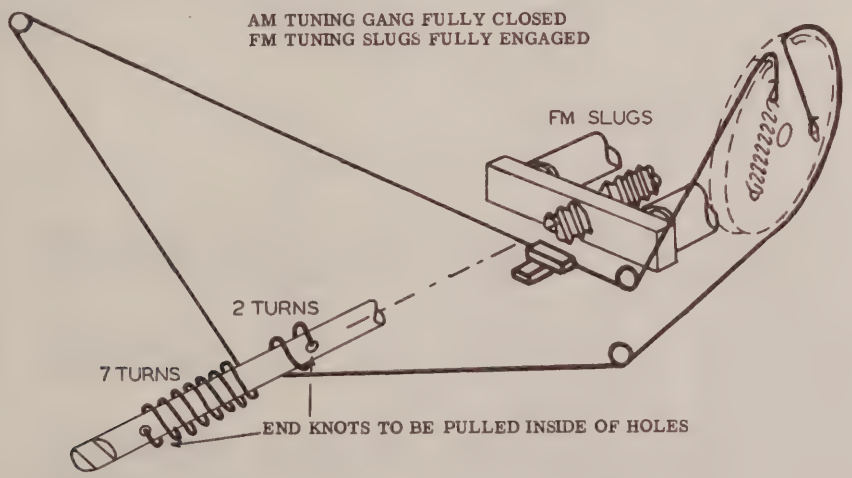


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



GRANCO
MODEL 720

TRADE NAME	Granco Model 720
MANUFACTURER	Granco Products, Inc., 36-17 20th Ave., Long Island City 5, N. Y.
TYPE SET	AC-DC Operated AM-FM Superheterodyne Receiver
TUBES (Seven)	Types 12BA6 FM RF Amp., 12AT7 FM Mixer-Osc., 12BE6 AM Conv., 12BA6 FM-AM IF Amp., 12BA6 2nd FM IF Amp. -AM Det., 19T8 Ratio Det. -AF Amp., 35C5 Output
POWER SUPPLY	105-120 Volts AC-DC — RATING .3Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	550KC-1600KC — FREQ. MOD. 88MC-108MC



DIAL CORD STRINGING

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		GRANCO PART No.	STANDARD REPLACEMENT		
V1	FM RF Amp.	12BA6	12BA6	7BK	
V2	FM Mixer-Osc.	12AT7	12AT7	9A	
V3	AM Converter	12BE6	12BE6	7CH	
V4	FM-AM-IF Amp.	12BA6	12BA6	7BK	
V5	FM IF Amp. - AM Det.	12BA6	12BA6	7BK	
V6	Ratio Det. - AF Amp.	19T8	19T8	9E	
V7	Audio Output	35C5	35C5	7CV	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	GRANCO PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	80	150		TCD498	TDL-8050-150	FMT-1540	
B	50	150					
C2	2	50		TC302	TD-2-50	MMT-0505	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

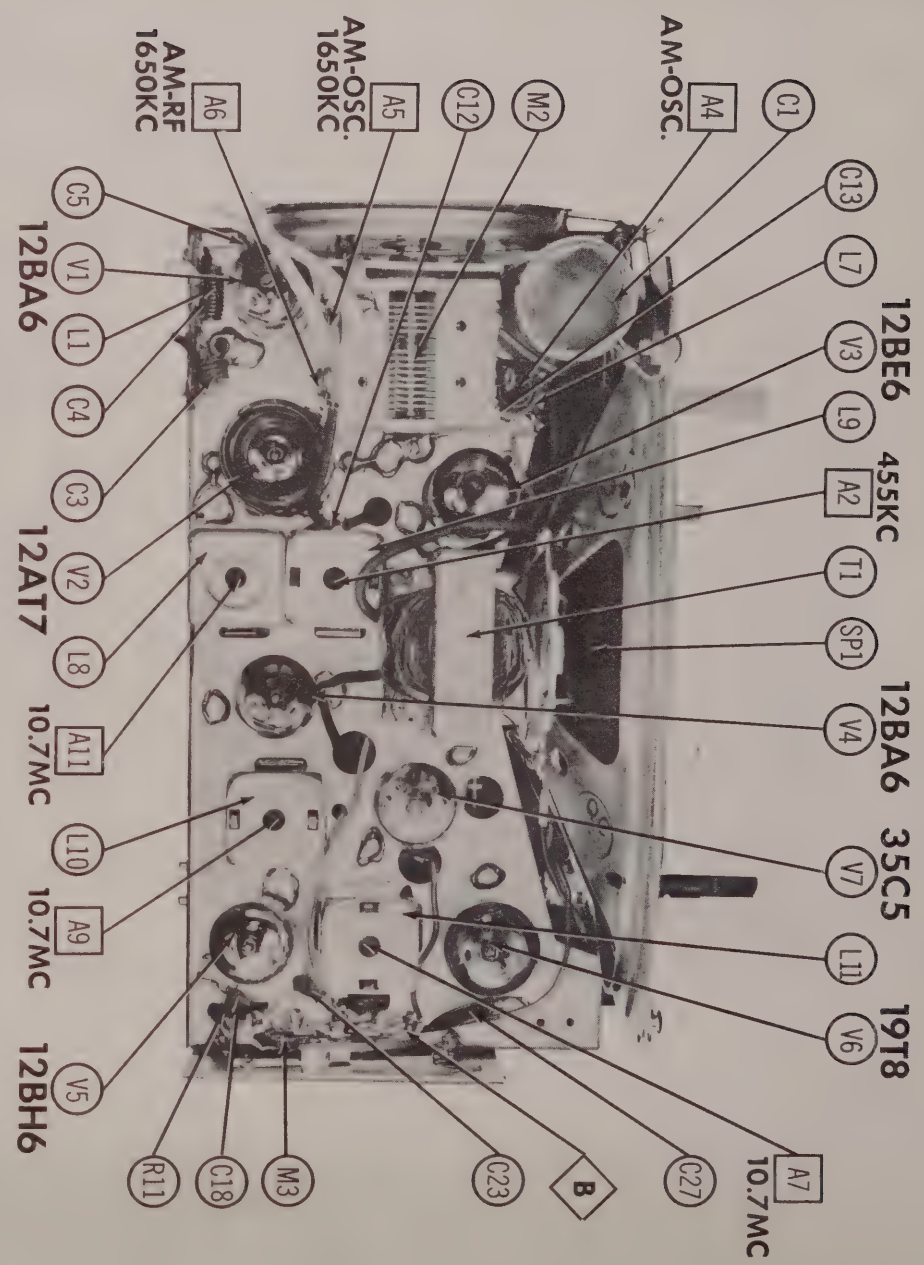
ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	GRANCO PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C3	50			TCZ-50	NPO-338-500	ZT-545	
C4	10			TCZ-10	NPOA-100	ZT-541	
C5	50			TCZ-50	NPO-338-500	ZT-545	
C6	2000			FT-2300			
C7	50			TCZ-50	NPO-338-500	ZT-545	
C8	.27						
C9	80						
C10	8.5						
C11	2000			DD-202	801-002	DC522	
C12	2000			DD-202	801-002	DC522	
C13	5			TCZ-5	NPOA-050	ZT-555	Note 1
C14	10000			DD-103	811-01	DC511	
C15	22			TCZ-22	NPOK-220		
C16	4000			DD-402	811-004	UC-5240	
C17	50			TCZ-50	NPO-338-500	ZT-545	
C18	470			DD-471	811-471	UC-5347	
C19	2000			DD-202	801-002	DC522	
C20	6.8						
C21	2000			DD-202	801-002	DC522	
C22	100			TCZ-100	801-101	ZT-531	
C23	2000			DD-202	801-002	DC522	
C24	4000			DD-402	811-004	UC-5240	
C25	10000			DD-103	811-01	DC511	
C26	4000			DD-402	811-004	UC-5240	
C27	10000			DD-103	811-01	DC511	
C28	2000			DD-202	801-002	DC522	
C29	2000			DD-202	801-002	DC522	
C30	2000			DD-202	801-002	DC522	
C31	2000			DD-202	801-002	DC522	

Note 1. Not used in some versions.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	GRANCO PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1Meg	½	BO458	Q11-137	A47-1Meg-S	AB-69	U-54	Volume
B	Shaft		Not Req.	Not Req.	FS-3	AK-3	Not Req.	Attach to R1A.
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA GRANCO PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R2	470KΩ	½		BTS-470K	
R3	10KΩ	½		BTS-10K	
R4	2200Ω	½		BTS-2200	
R5	22KΩ	½		BTS-22K	
R6	2. 7Meg	½		BTS-2. 7Meg	
R7	2. 7Meg	½		BTS-2. 7Meg	
R8	330Ω	½		BTS-330	
R9	330Ω	½		BTS-330	
R10	100KΩ	½		BTS-100K	
R11	1Meg	½		BTS-1Meg	
R12	330Ω	½		BTS-330	
R13	22KΩ	½		BTS-22K	
R14	1Meg	½		BTS-1Meg	
R15	33KΩ	½		BTS-33K	
R16	4. 7Meg	½		BTS-4. 7Meg	
R17	220KΩ	½		BTS-220K	
R18	470KΩ	½		BTS-470K	
R19	150Ω	½		BTS-150	
R20	10Ω	½		BTS-10	
R21	10Ω	½		BTS-10	
R22	900Ω	7		1 3/4A-900	
R23	22Ω	½		BTS-22	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA GRANCO PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2. 3KΩ	3. 2Ω		Z1101 ①	A-3025 ①	A-3332 ①	26S58 ①	S-12X ①	① Bend mounting tabs down, file out slots, mount on original mounting bracket.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA GRANCO PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	4"x6"	PM	3. 2Ω		46A1 ①	① Cut corners same as original unit.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA GRANCO PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	FM Ant. Coil	0Ω		AL477				
L2	RF Coil	. 1Ω		AL141	19-1002		4606	2. 9 Microhenries
L3	FM RF Coil	0Ω		AL455				
L4	FM Osc. Coil	0Ω		AL456				
L5	Cathode Choke	. 1Ω		AL141	19-1002		4606	2. 9 Microhenries
L6	AM Ant. Coil	. 7Ω		BL575				Includes cabinet back.
L7	AM Osc. Coil	8Ω		BL574	14-1073			Tapped @ . 8Ω
L8	1st FM IF	1Ω	1Ω	CL472	16-3487	FM-254	1463	
L9	1st AM IF	15Ω	15Ω	BL576	16-6758	BC-352	12-C1	
L10	2nd FM-AM IF Trans.	1Ω	8. 5Ω	BL567				
L11	Ratio Det.	1. 7Ω	. 9ΩCT	CL473	17-3498	FM-255	1465	Tertiary winding=. 4Ω

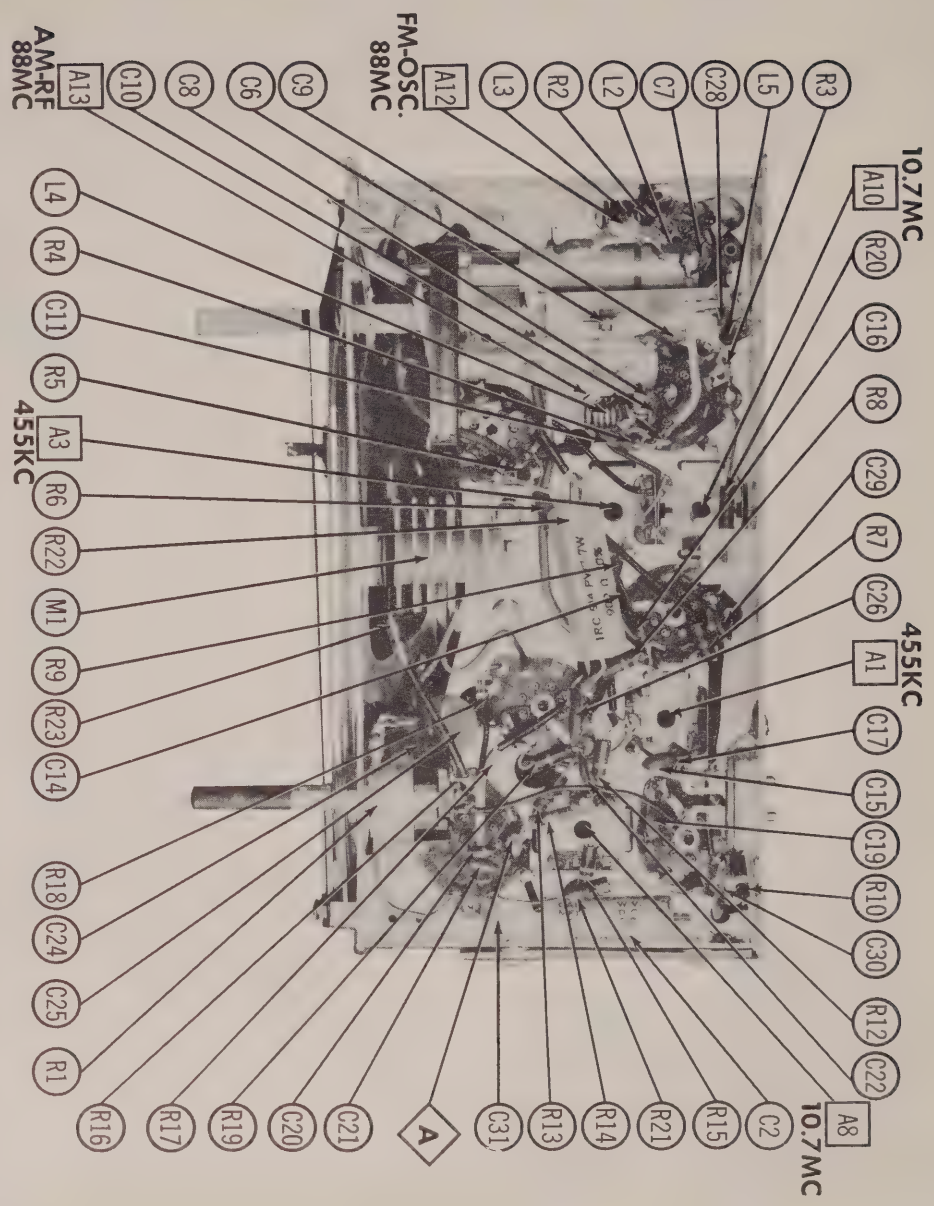
SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	REPLACEMENT DATA GRANCO PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	. 07A		1101A		6S100	5M1	100A	

MISCELLANEOUS

ITEM No.	PART NAME	GRANCO PART No.	NOTES
M2	Tuning Cap.	CC569	2 Gang (12-235MMF, 15-110MMF)
M3	Switch	A0552	AM-FM (Rotary-Wafer Type)

CHASSIS—BOTTOM VIEW



ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V3). Low side to chassis.	455KC (400~ Mod.)	AM	Tuning gang fully open.	Across Voice Coil	A1, A2, A3	Adjust for maximum deflection.
2.		Loop (Radiated)	610KC	"	Tune to 610KC Signal	"	A4	Adjust for maximum deflection while rocking tuning gang.
3.		"	1650KC	"	Tuning gang fully open.	"	A5, A6	Adjust for maximum deflection. Repeat steps 1, 2 & 3.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ(±1%) resistors in series from point A to chassis. The junction of these two resistors is alignment point C as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.01MFD	High side to pin 7 (grid) of 12AT7 (V2). Low side to chassis.	10.7MC (Unmod.)	FM	Point of non-interference	DC probe to point (A). Common to chassis.	A8, A9 A10, A11	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe to point (B). Common to point (C).	A7	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

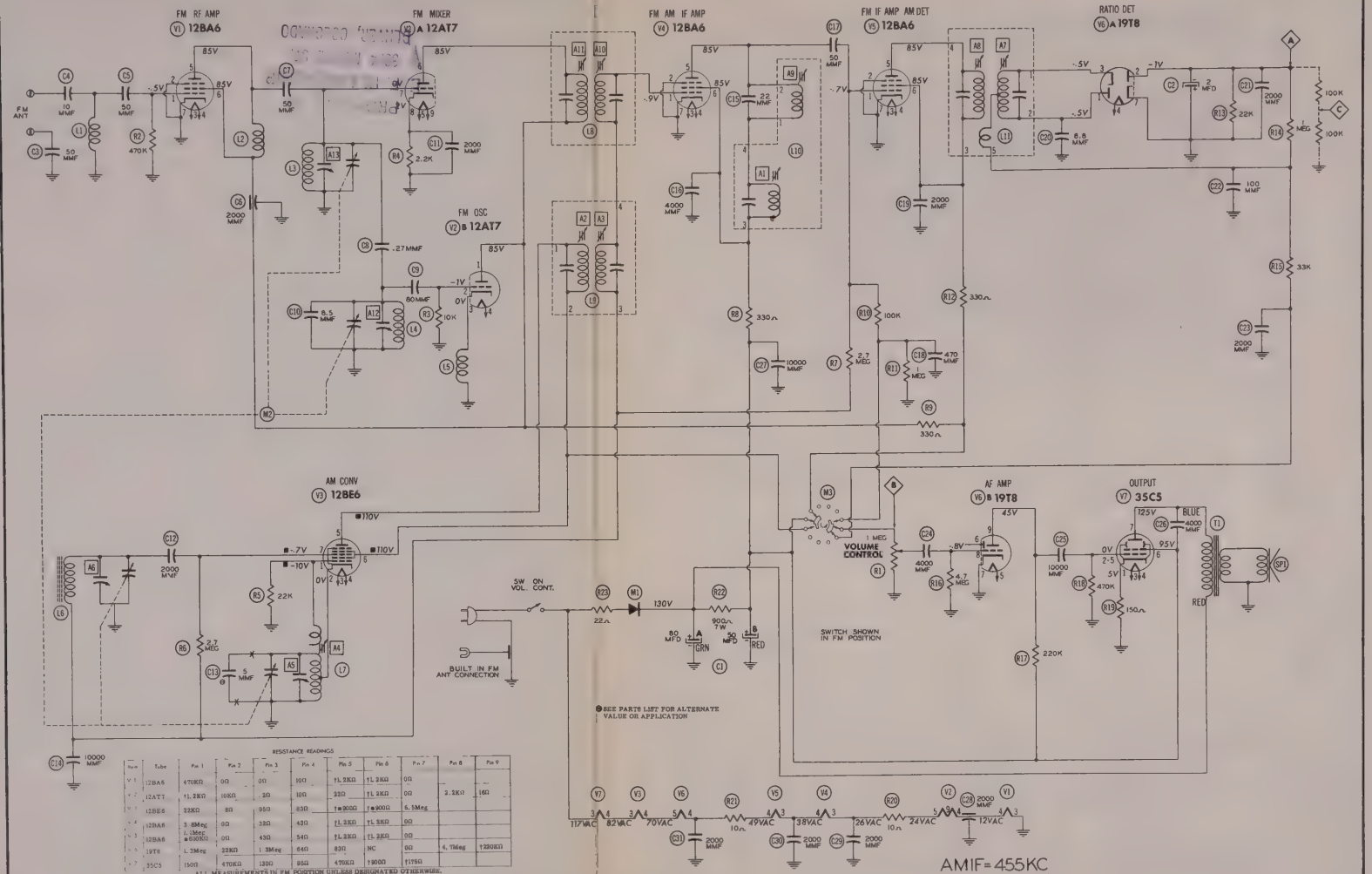
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.01MFD	High side to pin 7 (grid) of 12AT7 (V2). Low side to chassis.	10.7MC (450KC Swp.)	FM	Point of non-interference	Vert. Amp. to point (A). Low side to chassis.	A8, A9, A10, A11	Disconnect stabilizer capacitor (C2). Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
5.	"	"	"	"	"	Vert. Amp. to point (B). Low side to to chassis.	A7	Reconnect stabilizing capacitor (C2). Adjust so that 10.7MC occurs at center of crossover lines, similar to Fig. 2. SLIGHTLY retouch A8 for maximum amplitude and straightness of crossover lines. Proceed with Step 6.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	Two 39Ω Carbon Resistors	High side to antenna input. Low side to chassis, 39Ω in each lead.	108MC	FM	108MC (Slugs out)	DC probe to point (A). Common to chassis.	A12, A13	Adjust for maximum deflection.
7.	"	"	88MC	"	88MC (Slugs in)	"	L3, L4	Compress or expand coils for maximum deflection.

FIG. 1

FIG. 2



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12BA6	470KΩ	0Ω	0Ω	10Ω	†1.2KΩ	†1.2KΩ	0Ω		
V2	12AT7	†1.2KΩ	10KΩ	2Ω	10Ω	22Ω	†1.2KΩ	0Ω	2.2KΩ	16Ω
V3	12BE6	22KΩ	8Ω	95Ω	83Ω	†●90Ω	†●90Ω	6.5Meg		
V4	12BA6	3.6Meg	0Ω	32Ω	43Ω	†1.2KΩ	†1.2KΩ	0Ω		
V5	12BA6	1.2Meg ●600KΩ	0Ω	43Ω	54Ω	†1.2KΩ	†1.2KΩ	0Ω		
V6	19T8	1.3Meg	22KΩ	1.3Meg	64Ω	83Ω	NC	0Ω	4.7Meg	†230KΩ
V7	35C5	150Ω	470KΩ	120Ω	95Ω	470KΩ	†900Ω	†175Ω		

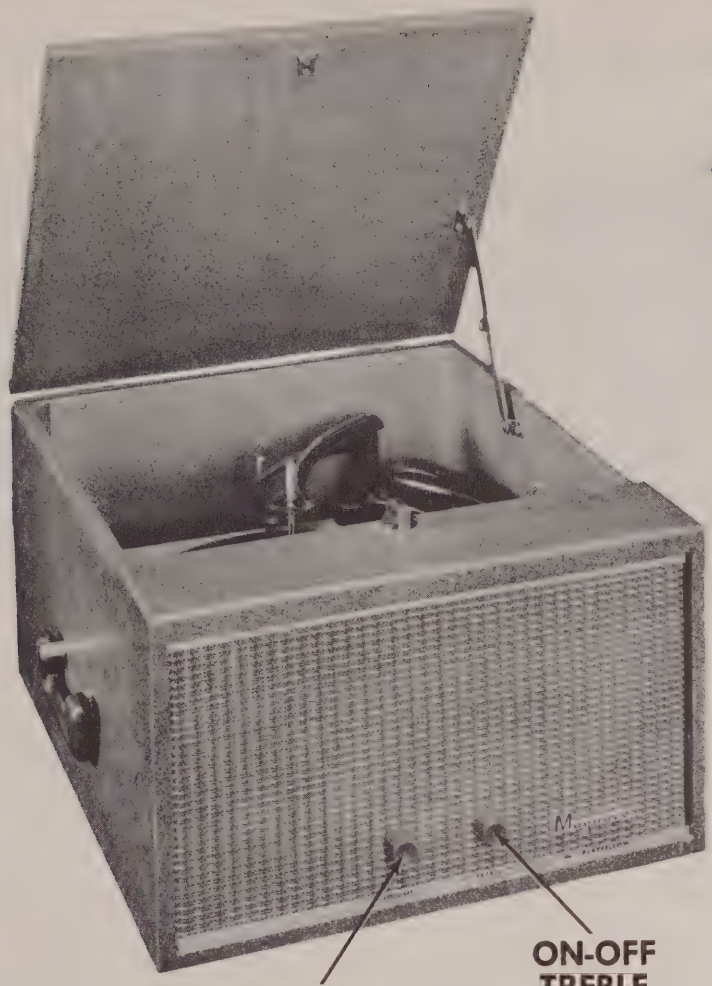
ALL MEASUREMENTS IN FM POSITION UNLESS DESIGNATED OTHERWISE.
●MEASURED IN AM POSITION.
†MEASURED FROM OUTPUT OF M1.
NC-NO CONNECTION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

© Howard W. Sams & Co., Inc. 1955

PROPERTY OF
L. F. ELECTRONICS
3924 MEADE ST.
DENVER, COLORADO

MAGNAVOX
CHASSIS AMP-134



MAGNAVOX
CHASSIS AMP-134

TRADE NAME	Magnavox Chassis AMP-134
MANUFACTURER	Magnavox Co., 2131 Bueter Rd., Fort Wayne, Ind.
TYPE SET	AC Operated Phono Amplifier With 3 Speed Automatic Record Changer
TUBES (Four)	Types: 12AX7 AF Amp. -Phase Inverter, (2) 6V6GT Output, 6X5GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .37 Amp. @ 117 Volts AC

RECORD CHANGER UNIT — SIMILAR TO WEBSTER-CHICAGO MODEL 114

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		MAGNAVOX PART No.	STANDARD REPLACEMENT		
V1	AF Amplifier-Phase Inverter	12AX7	12AX7	9A	
V2	Audio Output	6V6GT	6V6GT	7S	
V3	Audio Output	6V6GT	6V6GT	7S	
V4	Rectifier	6X5GT	6X5GT	6S	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	MAGNAVOX PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲40	350	270021-43		TM-4125	T-160	
B	■35	350				MTD-3520	
C	▲30	350					
D	30	350					
C2	20	25	270027-2	TC-26	TD-25-25	MMT-0220	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	MAGNAVOX PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C3	10000		250175-2	DD-103	811-01	DC-511	
C4	22	500	250187-45	TCZ-22	NP0K-220		
C5	.047	600	250201-11	DF-503		PT4147	
C6	.047	600	250201-11	DF-503		PT4147	
C7	220	500	250159-86	TCZ-220	NP0-335-221		
C8	.01	600	250201-7	D6-103	GP3-333-103	PT611	
C9	.1	200	250202-13	DF-104		PT401	
C10	.0068	600	250201-6	D6-682	GP3-333-682	PT6268	
C11	.1	200	250202-13	DF-104		PT401	
C12	10000	1000	250219-2	DD-103		PT1611	
C13	10000	1000	250219-2	DD-103		PT1611	

CONTROLS

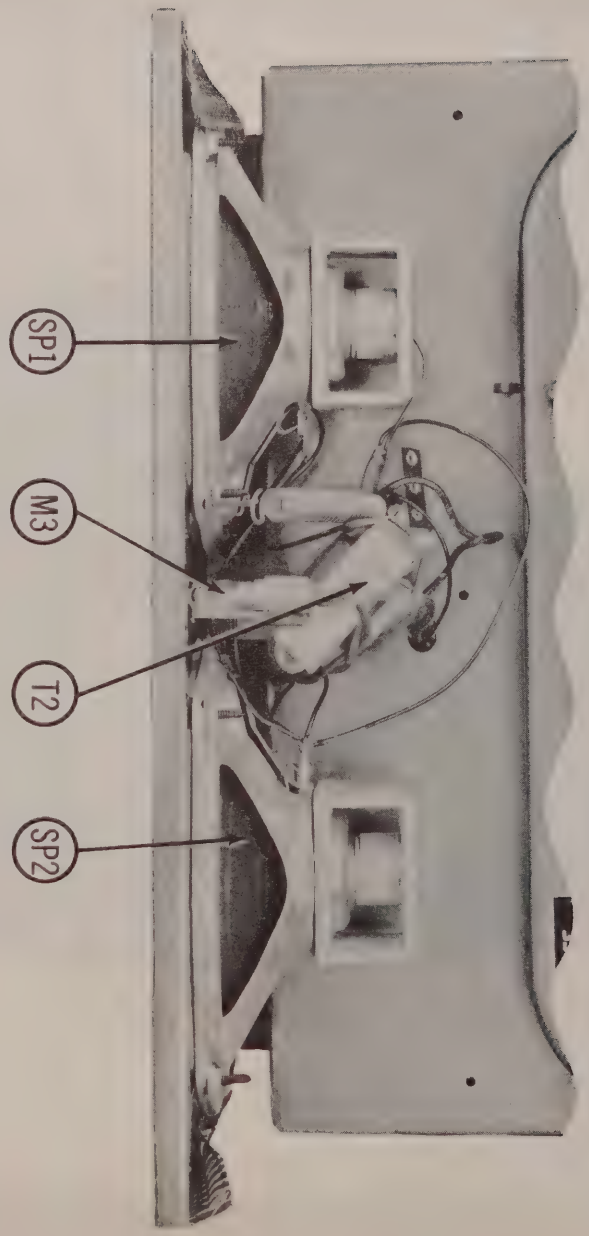
ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MAGNAVOX PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	3Meg	½	D220072-22	Q13-140	A47-3Meg-Z	B-85	U-57	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
R2A	5000Ω	½	220123-3	Q17-114		B-12-S		Treble-Note
B	Switch		Not Req.	76-1		Not Req.		Attach to R2A

Note. Some versions will use an alternate control (Part #220123-4).

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MAGNAVOX PART No.	IRC PART No.	
R3	820KΩ	½	230104-97	BTS-820K	
R4	1000Ω	½	230104-62	BTS-1000	
R5	3300Ω	½	230104-68	BTS-3300	
R6	470KΩ 5%	½	230104-94	BTS-470K 5%	
R7	22KΩ	½	230104-78	BTS-22K	
R8	5600Ω	½	230104-71	BTS-5600	
R9	470KΩ 5%	½	230104-94	BTS-470K 5%	
R10	470KΩ 5%	½	230104-94	BTS-470K 5%	
R11	470Ω	1	230105-58	BTA-470	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MAGNAVOX PART No.	IRC PART No.	
R12	470Ω	1	230105-58	BTA-470	
R13	100Ω	½	230104-50	BTS-100	
R14	100Ω	½	230104-50	BTS-100	
R15	470KΩ 5%	½	230104-94	BTS-470K 5%	
R16	15KΩ	1	230105-76	BTA-15K	
R17	5600Ω	½	230104-71	BTS-5600	
R18	10KΩ	½	230104-74	BTS-10K	
R19	10KΩ	½	230104-74	BTS-10K	
R20	68KΩ	½	230104-84	BTS-68K	
R21	400Ω	4	240021-42	1 3/4A-400	



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	MAGNAVOX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @.37A	520VCT .064ADC	6.3VAC @2.1A		300073-G1 300073-1 ①					

① Alternate power transformer.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MAGNAVOX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	9.3KΩ CT	1.8Ω	330037-2 330037-1①	Z1007	A-2901	A-3823	24S61	S-53X	① Alternate audio output

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MAGNAVOX PART No.	QUAM PART No.	
SP1	6"	PM	3.5Ω	583671	6A21LF	
SP2	6"	PM	3.6Ω	583663	6A21LF	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	MAGNAVOX PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1		55-T	GD-J	47	0-1 or S-1 & 0-3	

ASTATIC AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

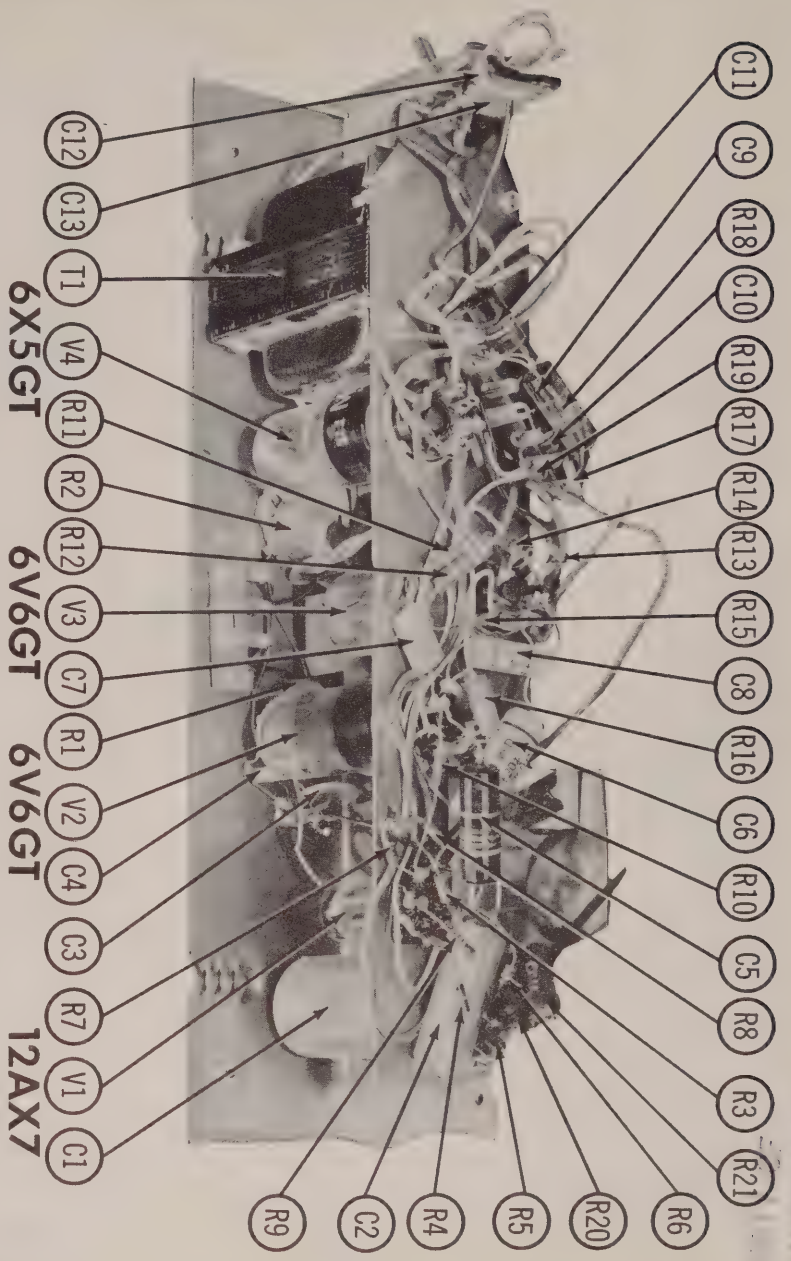
(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA				REMARKS
	MAGNAVOX PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M2		*S-67 or †S-66 or ♦†S-66SD ♦S-66D	†AC-434 or ♦†AC-434D1 or †♦AC-434D2 or ♦AC-434D	†W-75TPS or ♦†W-75DS or ♦W-75TPD	* Metal † Jewel ♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	MAGNAVOX PART No.	NOTES
M3	Pilot Light		#44

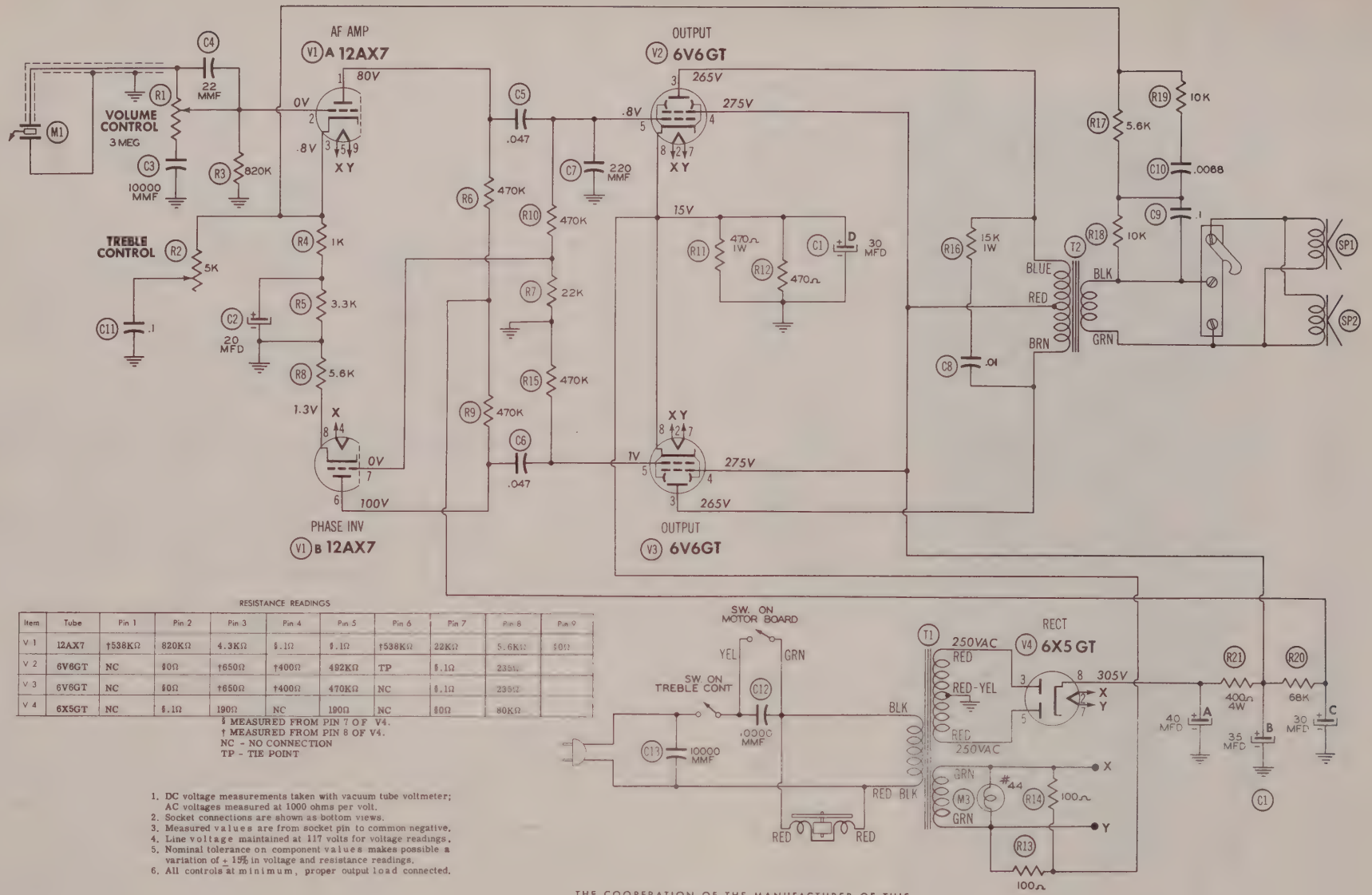
CHASSIS—BOTTOM VIEW



SET 297 FOLDER 4

MAGNAVOX Chassis AMP-134

MAGNAVOX Chassis AMP-134



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†538KΩ	820KΩ	4.3KΩ	§.1Ω	§.1Ω	†538KΩ	22KΩ	5.6KΩ	§0Ω
V 2	6V6GT	NC	§0Ω	†650Ω	†400Ω	492KΩ	TP	§.1Ω	235Ω	
V 3	6V6GT	NC	§0Ω	†650Ω	†400Ω	470KΩ	NC	§.1Ω	235Ω	
V 4	6X5GT	NC	§.1Ω	190Ω	NC	190Ω	NC	§0Ω	80KΩ	

§ MEASURED FROM PIN 7 OF V4.
† MEASURED FROM PIN 8 OF V4.
NC - NO CONNECTION
TP - TIE POINT

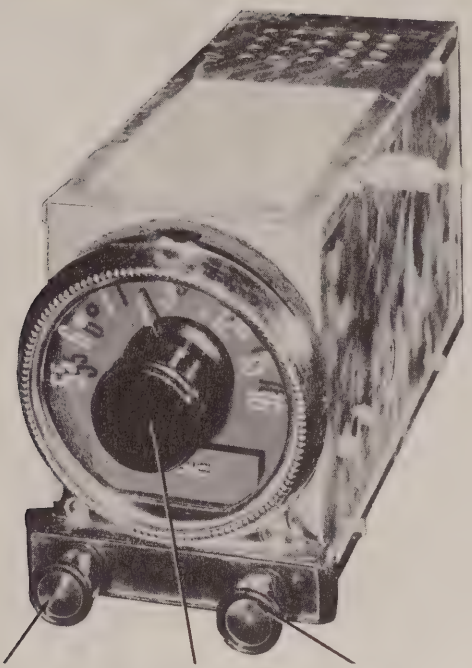
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1955

NORDIC
MODEL 501F55



NORDIC
MODEL 501F55

TRADE NAME	Nordic Model 501F55 (For 1955 Ford Automobiles)
MANUFACTURER	Nordic Radio Co., Box 582, Evanston, Ill.
TYPE SET	Battery Operated Custom Built AM Superheterodyne Automobile Receiver
TUBES (Five)	Types 6BE6 Conv., 6BA6 IF Amp., 6AV6 Det. -AVC-AF Amp., 6AQ5 Output, 6X4 Rectifier
POWER SUPPLY	6 Volt Storage Battery — RATING 4.8 Amp. @ 6.3 Volts DC
TUNING RANGE—BROADCAST	540KC-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Tone control to treble position.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (V1). Low side to chassis.	455KC (400% Mod.)	High frequency end of dial.	Across Voice Coil	A1, A2, A3, A4	Adjust for maximum output.
2.	Fig. 1	Thru dummy to antenna receptacle.	1605KC	"	"	A5	"
3.	"	"	1400KC	Tune to 1400KC signal.	"	A6, A7	Adjust for maximum output. With receiver installed in car and antenna fully extended, tune to weak signal near 1400KC and adjust A7 for maximum volume.

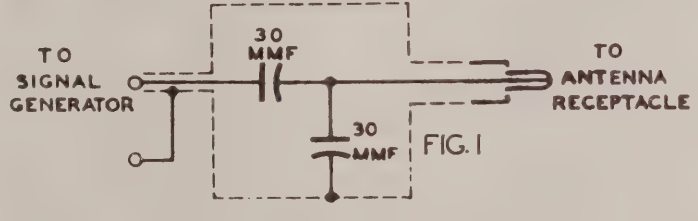


FIG. 1

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

NORDIC
Model 501F55

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		NORDIC PART No.	STANDARD REPLACEMENT		
V1	Converter	6BE6	6BE6	7CH	
V2	IF Amp.	6BA6	6BA6	7BK	
V3	Det. -AVC-AF Amp.	6AV6	6AV6	7BT	
V4	Output	6AQ5	6AQ5	7BZ	
V5	Rect.	6X4	6X4	5BS	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	NORDIC PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■15	350	22-8	FP328	TM-3026	T-455	
B	▲10	350					
C	20	25					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	NORDIC PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2	18		22-10	TCN-18	N750K-180		
C3	2700		22-13	D6-272	811-0027	UC-5227	
C4	50		22-4	TCN-50	N750K-500	NT-5447	
C5	.047	400	22-6	DF-503		PT4147	
C6	.047	400	22-6	DF-503		PT4147	
C7A	220		♦	♦PC-151	♦1408-02		
B	5000						
C	5000						
D	250						
E							
C8	.0039	400		D6-392	GP2-333-402	PT6239	
C9	.068	200	22-15				
C10	.03	1000	22-11			PT1613	
C11	.5	100	22-9			RF480	
C12	.5	200	22-9			RF480	
C13A	250		22-12				
B	250						

Note 1. Some versions may use a .01MMF unit (Part Number 22-14) in this application.
Note 2. Not used in some versions.
♦ Items C6A, C6B, C6C, C6D, C6E, R9A, R9B and R9C are combined in one unit. When replacing items separately, items C6D and C6E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	NORDIC PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	210-2	Q13-133	A47-500K-Z	AB-60	U-48	Volume
B	Shaft		Not Req.	Not Req.	RS-2	AK-9	Not Req.	Attach to R1A.
C	Switch		Not Req.	76-1	SWE-12	KB-4	US-26	Attach to R1A.

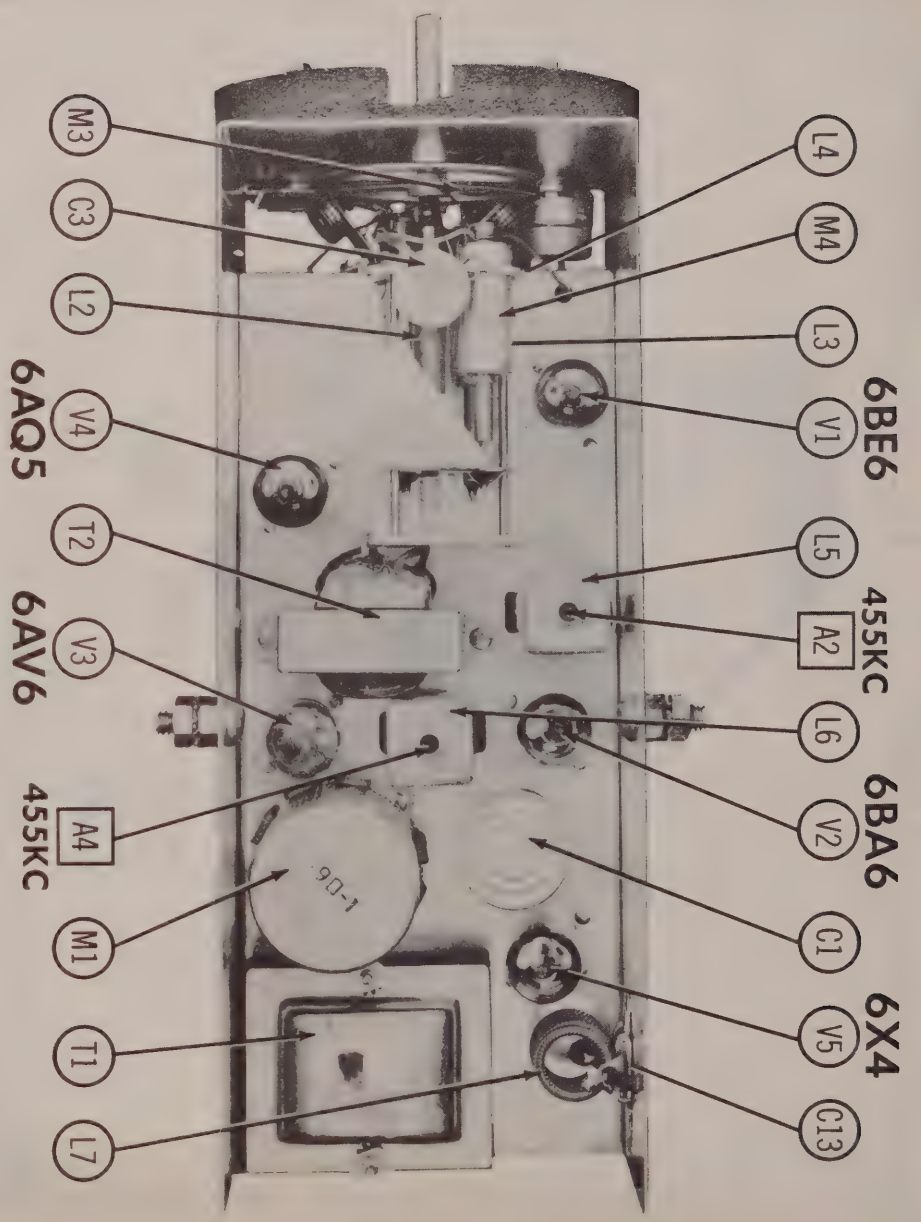
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	NORDIC PART No.	IRC PART No.	
R2	470KΩ	½		BTS-470K	
R3	47KΩ	½		BTS-47K	
R4	6800Ω	1		BTA-6800	
R5	330Ω	½		BTS-330	
R6	1Meg	½		BTS-1Meg	
R7	470Ω	½		BTS-470	
R8	10KΩ	½		BTS-10K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Nordic Radio Co. PART No.	IRC PART No.	
R9A	6.8Meg	½	♦	BTS-6.8Meg	
B	470KΩ	½		BTS-470K	
C	470KΩ	½		BTS-470K	
R10	2200Ω	1		BTA-2200	
R11	270Ω	1		BTA-270	
R12	56Ω	½		BTS-56	
R13	56Ω	½		BTS-56	

♦ Items C6A, C6B, C6C, C6D, C6E, R9A, R9B, R9C are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	NORDIC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	6.3VCT ②2.8A	470VCT .042ADC			95-2					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	NORDIC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5KΩ	3.7Ω	95-1	Z1107	A-2930	A-3877	24S51	S-3X	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	NORDIC PART No.	QUAM PART No.	
SP1	6" x 9"	PM	3.7Ω	49-1	69A2	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	NORDIC PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Loading Coil			20-1				Not used in all versions
L2	Ant. Coil	12Ω						Part of complete assy.
L3	RF Coil	12Ω						Part of complete assy.
L4	Osc. Coil	.6Ω	2.7Ω					Part of complete assy.
L5	Input IF	15Ω	15Ω	95-3	16-6758	BC-352	12-C1	
L6	Output IF	15Ω	15Ω	95-3	16-6758	BC-353	12-C2	
L7	Fil. Choke	0Ω		20-3	19-4215		5221	1 Microhenry
L8	Vib. Hash Choke	0Ω		20-2				13.5 Microhenries

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FRE-QUENCY	REPLACEMENT DATA				NOTES
				NORDIC PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interruptor	6.3V	115Ω	190-1	5301	859	5301	

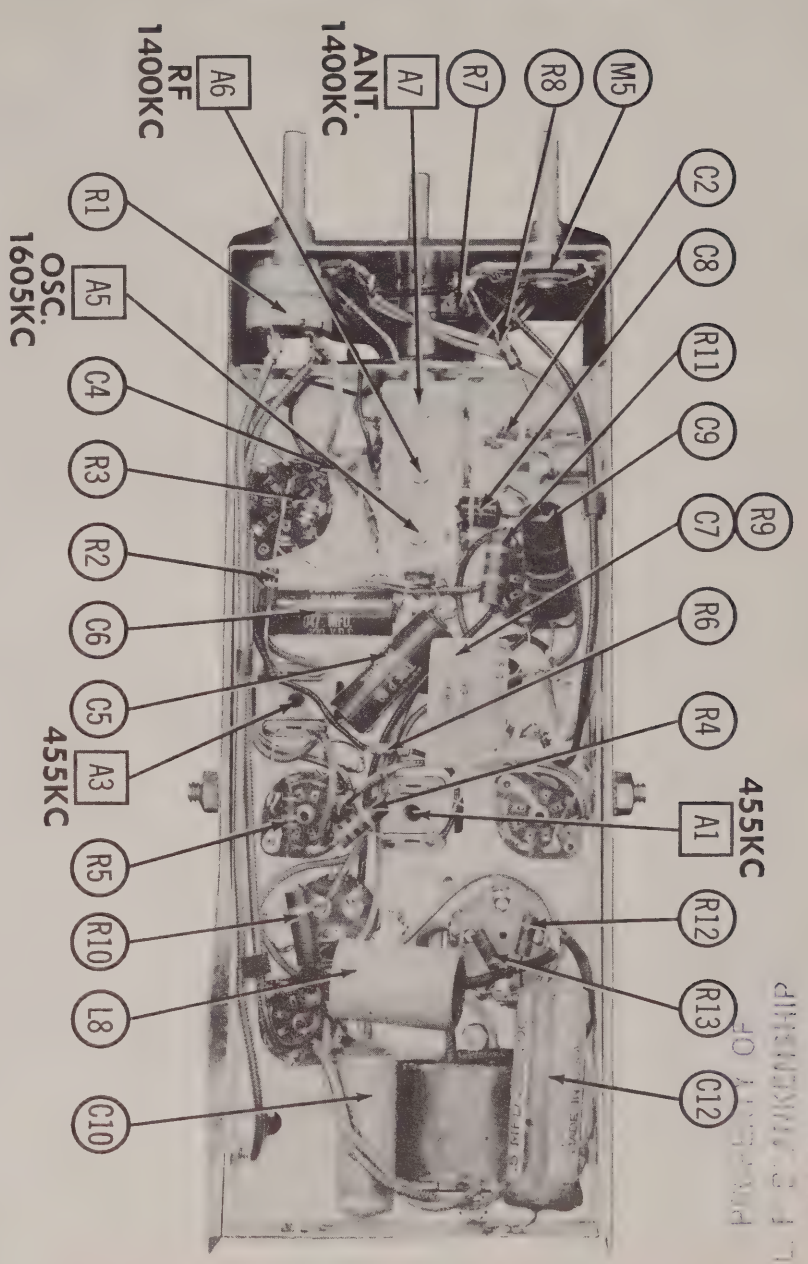
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			NORDIC PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	SFE	9A	136-1	51-1	307009 (SFE9A)	155009	SFE9	HRH

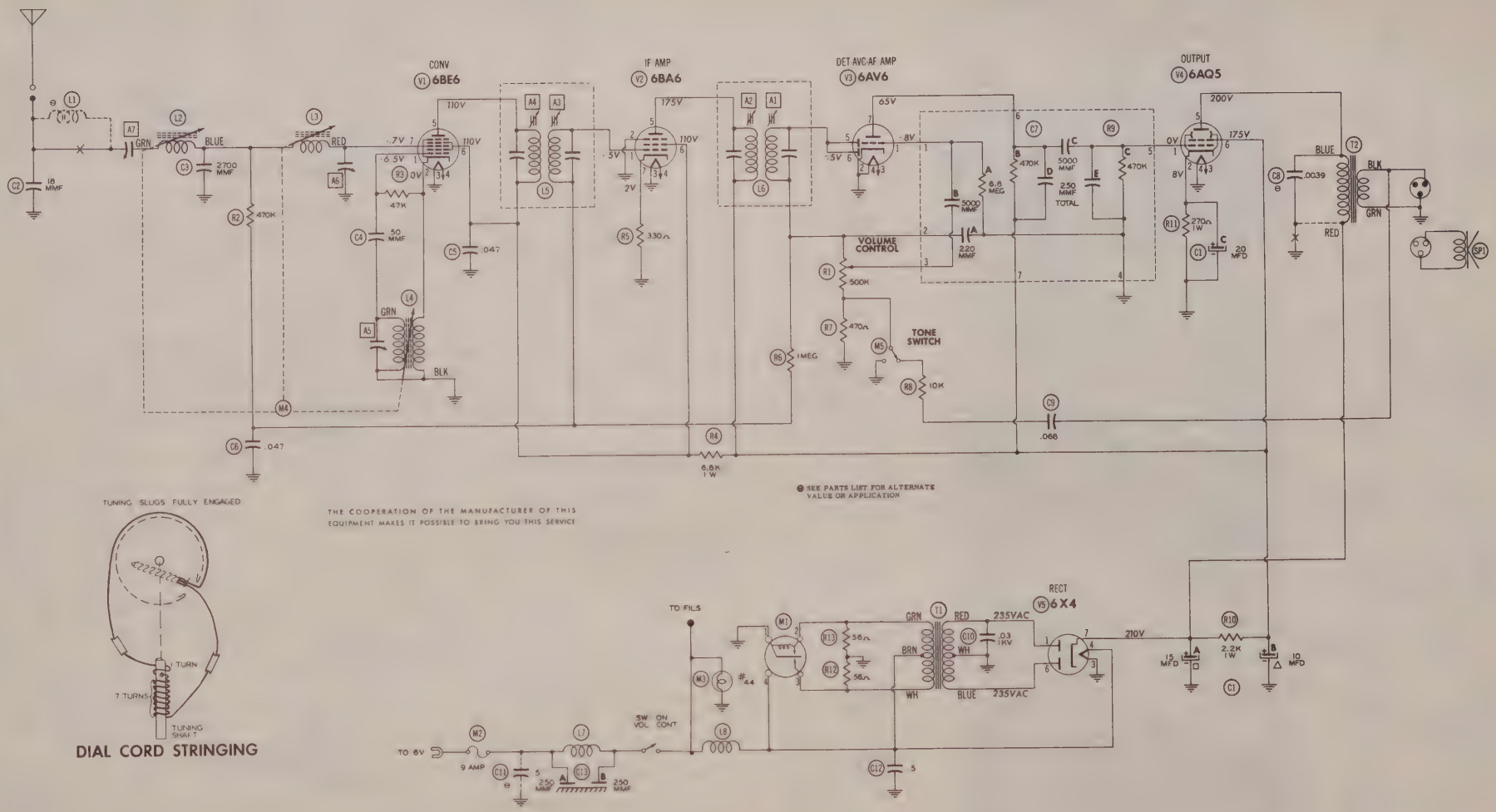
MISCELLANEOUS

ITEM No.	PART NAME	NORDIC PART No.	NOTES
M3	Dial Light	100-1	#44
M4	Tuner	NR-3	Permeability-complete - Includes L2, L3, L4
M5	Switch	85-1	Tone (SP-2 position)
A5	Trimmer Strip	22-1	Osc. Trimmer (430MMF Nom.)
A7			Ant. Padder (250MMF Nom.)
A6			Ant. Trimmer (50MMF Nom.)
	Knob	46-1	On-off-volume & tone
	Knob	46-3	
	Dial Pointer	59-3	
	Dial Glass	192-1	Includes dial scale

CHASSIS—BOTTOM VIEW



PROPERTY OF
CORNELL-DUBILIER ELECTRIC CORP.
SOUTH PLAINFIELD, N. J.



DIAL CORD STRINGING

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	6BE6	47KΩ	0Ω	0Ω	0Ω	18KΩ	18KΩ	1.9Meg
V2	6BA6	.5Meg	0Ω	0Ω	0Ω	19.2KΩ	19KΩ	330Ω
V3	6AV6	6.8Meg	0Ω	0Ω	0Ω	500KΩ	500KΩ	1472KΩ
V4	6AQ5	42KΩ	270Ω	0Ω	0Ω	1400Ω	12.2KΩ	NC
V5	6X4	40Ω	TP	0Ω	0Ω	TP	400Ω	1Meg

(M) MEASURED FROM PIN 1 OF V3
TP-TUBE POINT
NC-NO CONNECTION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 6.3 volts for voltage readings.
5. Nominal tolerance on components values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

OLYMPIC MODELS 21CZ57, 21CZ72, 21DZ73, 21KZ23, 21KZ25, 21KZ39, 21TZ56, 21DZ Series (Chassis "Z")

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

DENVER, COLORADO
3504 MEADE ST.
E. BLANKENSHIP
PROPERTY OF

MODEL 21KZ25

OLYMPIC MODELS 21CZ57, 21CZ72, 21DZ73, 21KZ23, 21KZ25, 21KZ39, 21TZ56, 21DZ Series (Chassis "Z")

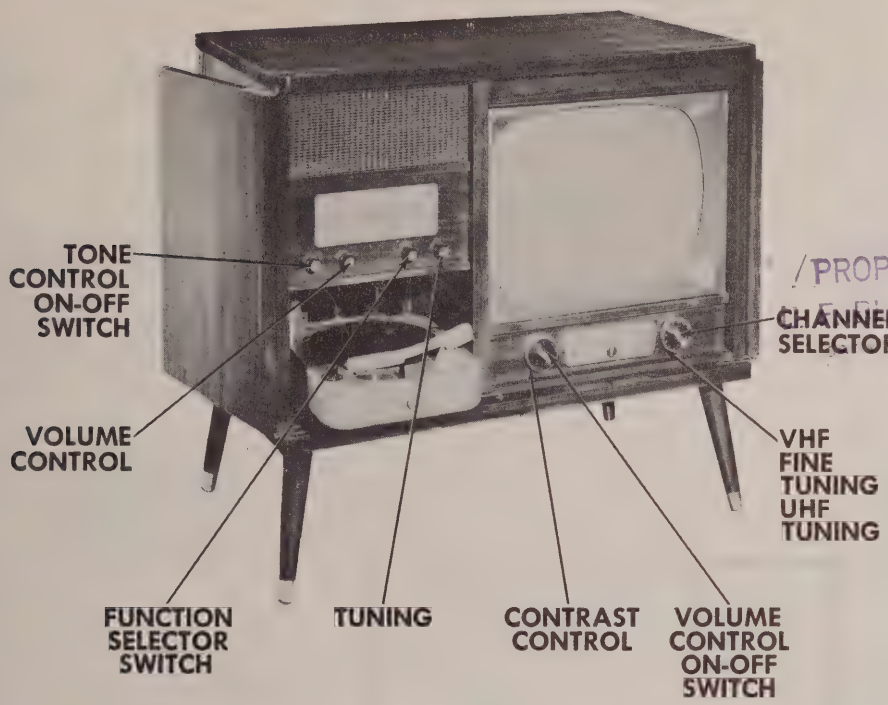
HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 11–55 SET 297 FOLDER 6

PHOTOFACT* Folder
*TRADE MARK

OLYMPIC MODELS 21CZ57, 21CZ72, 21DZ73, 21KZ23, 21KZ25, 21KZ39, 21TZ56, 21DZ Series (Chassis "Z")



PROPERTY OF
E. BLANKENSHIP
DE ST.
COLORADO

OLYMPIC MODELS 21CZ57, 21CZ72, 21DZ73, 21KZ23, 21KZ25, 21KZ39, 21TZ56, 21DZ Series (Chassis "Z")

OLYMPIC MODEL 21KZ25

TRADE NAME	Olympic	MODELS	CHASSIS
		21CZ57, 21CZ72, 21DZ73, 21KZ23, 21KZ25, 21KZ39, 21TZ56, 22DZ101, 22DZ116, 22DZ120, 22DZ121, 22DZ122, 22DZ123, 22DZ124	"Z"
MANUFACTURER	Olympic Radio & Television, Inc., 34-01 38th. Ave., Long Island City 1, N.Y.		
TYPE SET	TV-Radio-Phono Combination		
TUBES	Twenty (TV), Six (Radio)		
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING	TV-1.56 Amp. @ 117 Volts AC, Radio-.33 Amp. @ 117Volts AC
TV TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		
RADIO TUNING RANGE	540-1620KC, AM IF 455KC		

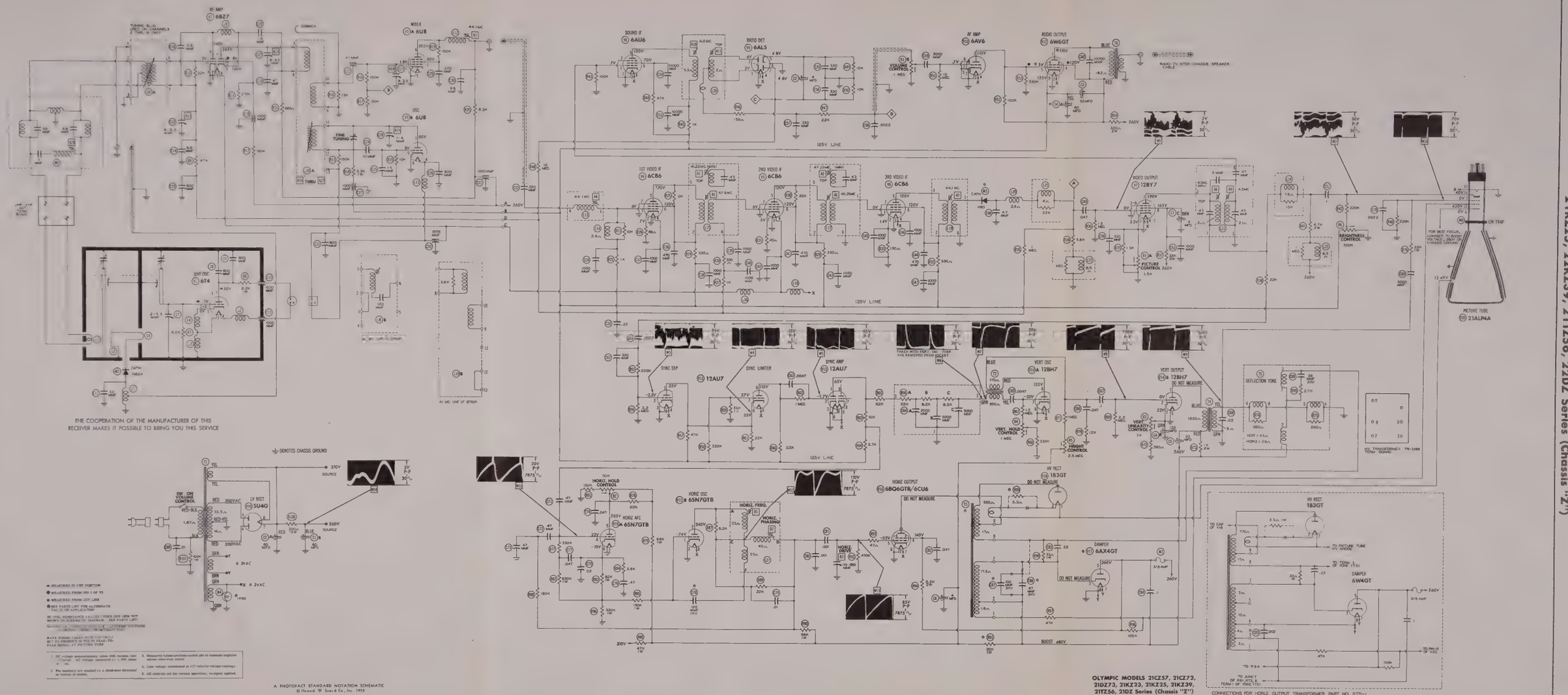
INDEX

Alignment Instructions 6, 7
Drive Cord Stringing (Radio) 19
Disassembly Instructions 22
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions ..... 15 thru 19
Photographs
Cabinet-Rear View 11
Capacitor Identification 4, 9
Chassis-Top View 3
Radio Chassis (Top & Bottom Views) 10
RF Tuner 21
Photographs (Cont)
Resistor Identification 13, 20
Trans., Inductor & Alignment Identification 23
Resistance Measurements 8
Servicing in the Field 22
Schematic (Radio) 14
Schematic (TV) 2
Trouble Shooting Aids 12, 21
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

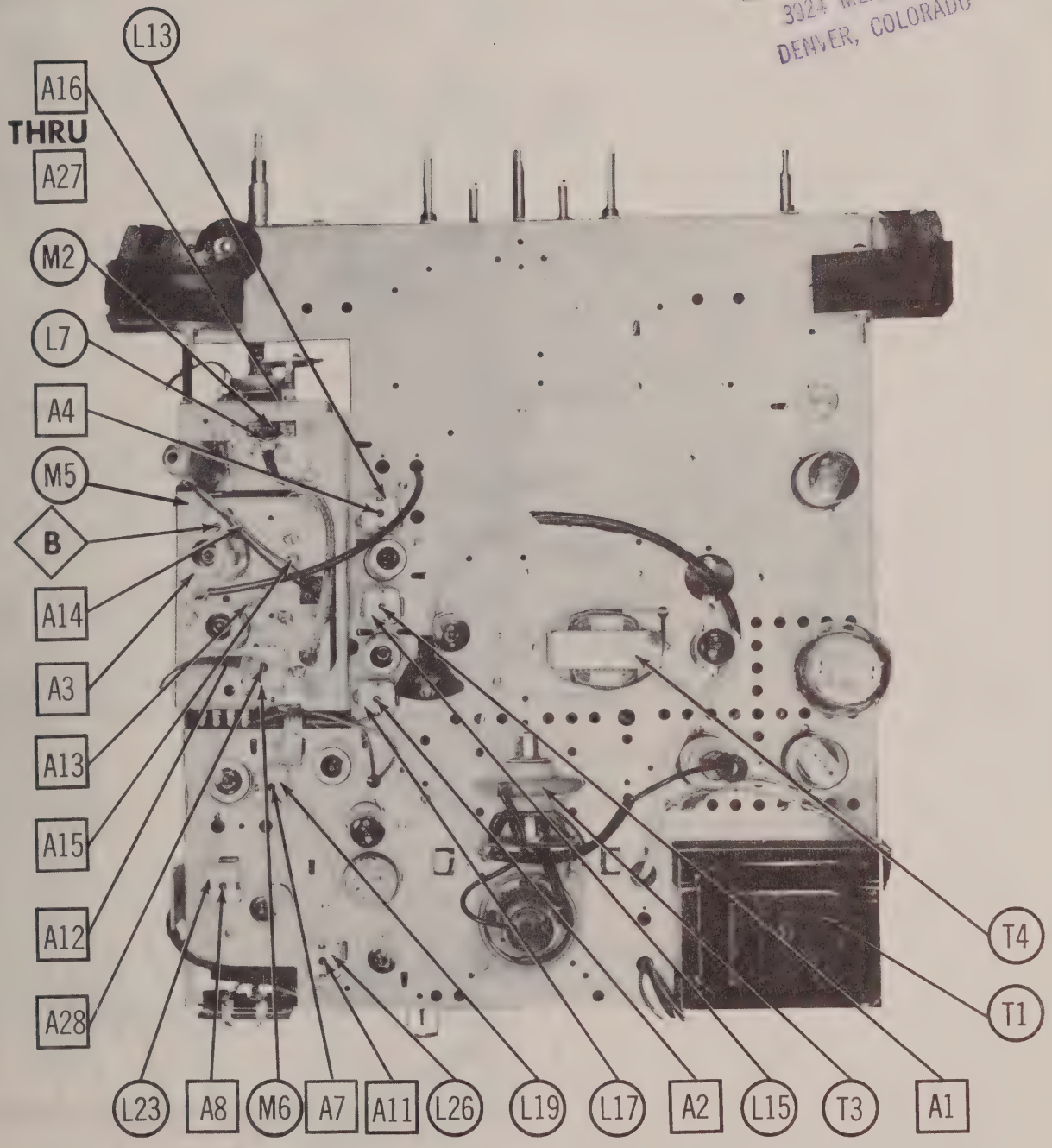
FOR SERVICE INFORMATION ON RECORD CHANGER MODEL V-M 950, SEE PHOTOFACT SET 216, FOLDER 11, ALSO SEE RECORD CHANGER MANUAL CM-5.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America


OLYMPIC MODELS 21CZ57, 21CZ72, 21DZ73, 21KZ23, 21KZ25, 22KZ39, 21TZ56, 22DZ Series (Chassis "Z")
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
DENOTES CHASSIS GROUND
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955
OLYMPIC MODELS 21CZ57, 21CZ72, 21DZ73, 21KZ23, 21KZ25, 21KZ39, 21TZ56, 21DZ Series (Chassis "Z")
CONNECTIONS FOR HORIZ. OUTPUT TRANSFORMER PART NO. 2771-1

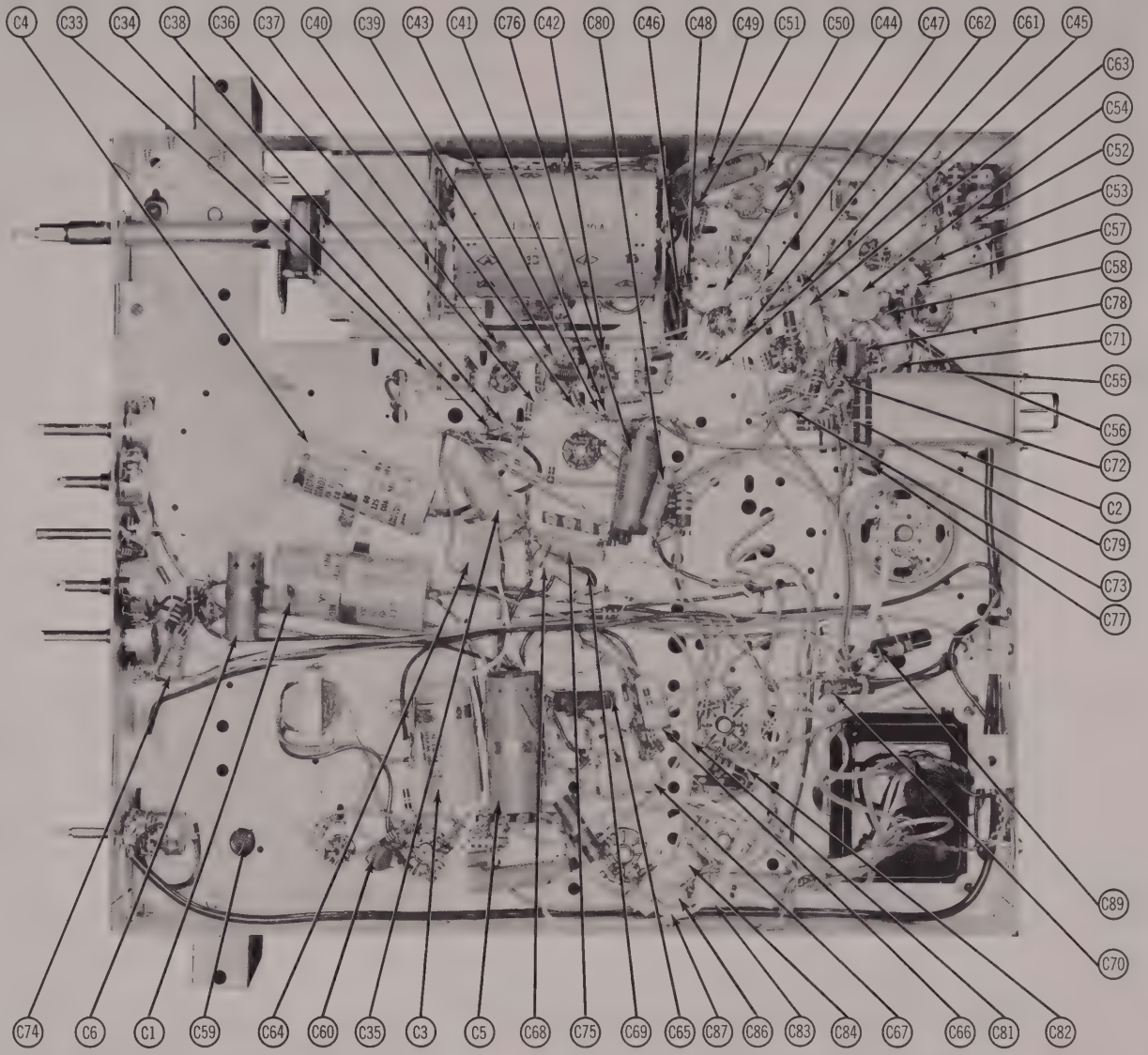
PROPERTY OF
L. F. BLANKENSHIP
3024 MEADE ST.
DENVER, COLORADO



CHASSIS TOP VIEW

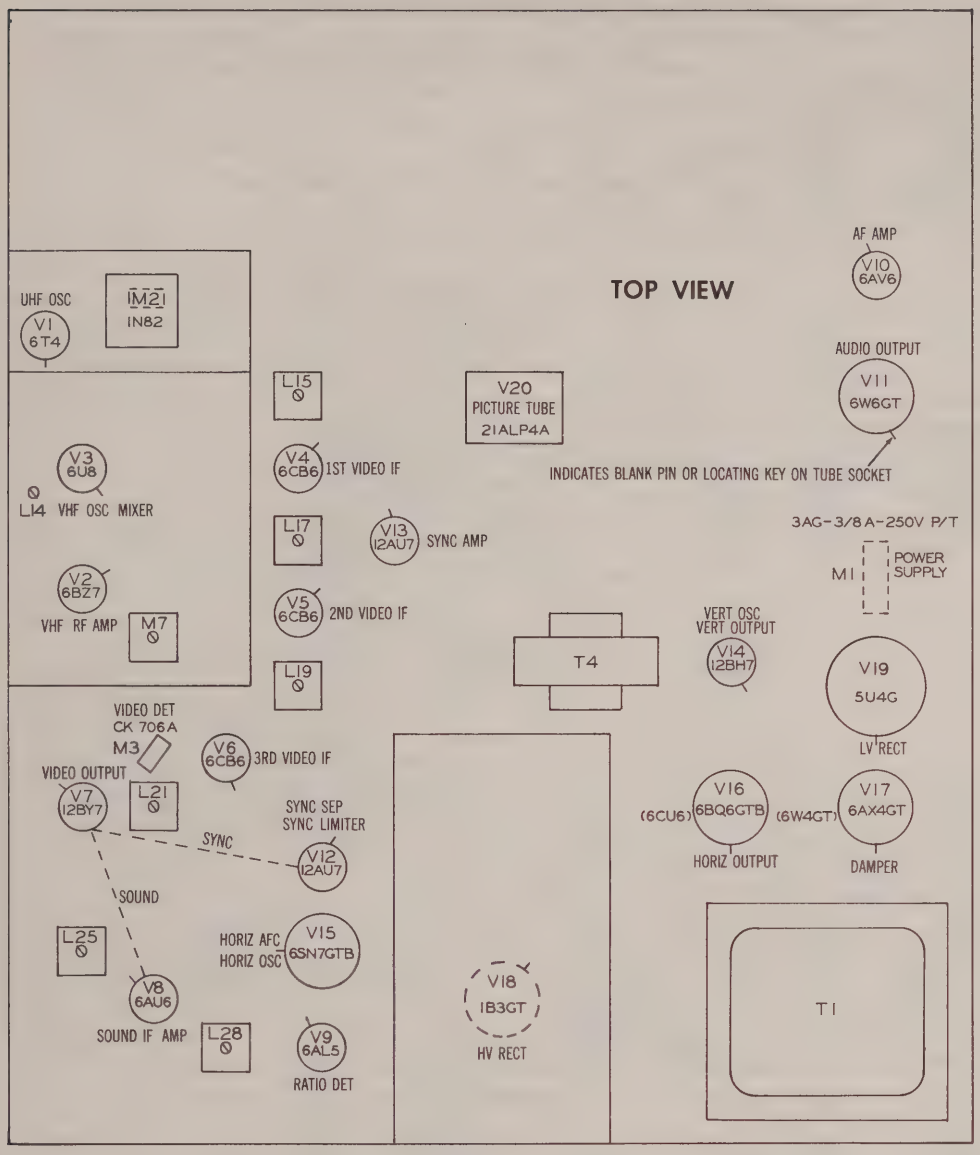
SET 297 FOLDER 6

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST
DENVER, COLORADO



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V19

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6, V7, V11 (V1 UHF Only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V7, V20
Has pic, no sound - V8, V9, V10, V11

SYNC FAILURE
No vert. sync - V13, V14
No horiz. sync - V13, V15
No vert. or horiz. sync - V12, V13

SWEEP FAILURE
No raster, has sound - V15, V16, V17, V18, V20, Fuse (M1)
No vertical deflection - V14
Poor vert. linearity or foldover - V14
Poor horiz. linearity or foldover - V15, V16, V17
Narrow picture - V15, V16, V17, V18, V19
Vert. off freq. - V13, V14
Horiz. off freq. - V13, V15

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from chassis.

VIDEO IF ALIGNMENT

IF oscillation occurs during alignment (varying signal generator output will have no effect on VTVM reading) detune A7 and adjust A3, A4, A5 and A6 as in steps 3, 4 and 5, then adjust A7 as in step 6.
Use only enough signal generator output for useable reading on VTVM
Remove the RF Amplifier (V2) from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube.	41.25MC (Unmod)	Any non-interfering channel	DC probe thru 100KΩ to point (A). Common to chassis.	A1	Adjust for MINIMUM deflection.
2.	"	"	47.25MC	"	"	A2	"
3.	"	"	44.1MC	"	"	A3, A4	Adjust for maximum deflection.
4.	"	"	42.9MC	"	"	A5	"
5.	"	"	45.25MC	"	"	A6	"
6.	"	"	44.1MC	"	"	A7	"

OVERALL VIDEO IF RESPONSE CHECK

Connect the negative lead of a 1.5 volt battery to the ungrounded side of C35. Connect the positive lead to chassis.
Use only enough sweep generator output for useable pattern on scope. Keep marker generator output low.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.003MFD	High side to point (B). Low side to chassis.	44MC (10MC Swp)	43.5MC 44.1MC 45.75MC	Any non-interfering channel	Vert. Amp. thru detector (Fig. 1) to pin 1 (grid) of 6CB6 (V5). Low side to chassis.		If separate marker generator is used couple it loosely to an ungrounded tube shield over converter tube (V3). Check for response curve similar to Fig. 2. If necessary SLIGHTLY retouch A3 and A4 for desired response.
8.	"	"	"	41.25MC 42.5MC 45.75MC 47.25MC	"	Vert. Amp. thru 100KΩ to point (A). Low side to chassis.		Check for response similar to Fig. 3. If necessary SLIGHTLY retouch A5, A6 and A7 for desired response. A5 affects the low frequency side of response curve and position of 42.5MC marker. A6 affects the high frequency and position of 45.75MC marker. Adjust A7 for MINIMUM tilt. Do not readjust A3 or A4. If necessary, increase sweep generator output and use high scope gain to view trap regions. Adjust A1 and A2 to place 41.25MC and 45.75MC markers in center of trap notches as in Fig. 3. Remove 1.5 volt bias battery. Replace V2 in its socket.

4.5MC TRAP ALIGNMENT

Set contrast control for maximum contrast.
Remove 6CB6 (V6) from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru detector (Fig. 4) to pin 11 cathode of picture tube. Common to chassis.	A8	Adjust for MINIMUM deflection. Use maximum signal generator output. Replace V6 in its socket.

ALTERNATE 4.5MC TRAP ALIGNMENT

Tune in any local TV station. Adjust fine tuning control to emphasize 4.5MC beat interference in picture. Adjust A8 to minimize the 4.5MC beat in the picture.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Remove 6CB6 (V6) from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point (C). Common to chassis.	A9, A10	Adjust for maximum deflection.
11.	"	"	"	"	DC probe to point (D). Common to chassis.	A-11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Replace V6 in its socket.

SOUND IF ALIGNMENT USING TV SIGNAL AND VTVM

Tune in any local station.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	Not used	Not used	Not used	Any local station	DC probe to point (C). Common to chassis.	A9, A10	Adjust for maximum deflection. (Use 30VDC scale).
11.	"	"	"	"	DC probe to point (D). Common to chassis.	A-11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. (Use 3VDC scale).

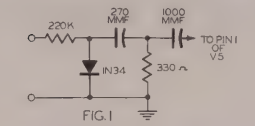


FIG. 1

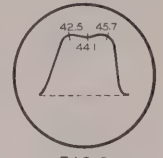


FIG. 2

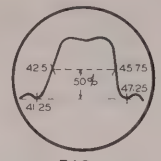


FIG. 3

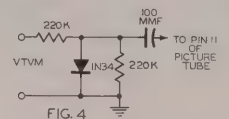


FIG. 4

FIG. 5

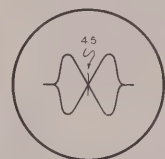


FIG. 6

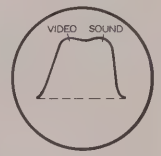


FIG. 7

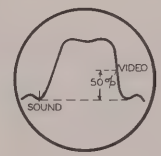


FIG. 8

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Remove 6CB6 (V6) from its socket.
Use frequency modulated signal with 80% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point (C). Low side to chassis.	A9, A10	Disconnect stabilizing capacitor C2. Adjust for curve of maximum amplitude and symmetry similar to Fig. 5.
11.	"	"	"	"	"	Vert. Amp. to point (D). Low side to chassis.	A-11	Reconnect stabilizing capacitor C2. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 8. SLIGHTLY retouch A10 for maximum amplitude and straightness of crossover lines. Replace V6 in its socket.

VHF RF AND MIXER ALIGNMENT

Connect a short clip lead across C35.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A13, A13, A14	Adjust for curve similar to Fig. 7 with markers above 90%.
13.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		If markers fall below 70% on any channel, make compromise adjustment of A13, A13 and A14 with channel switch set to that channel. Then check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

VHF OSCILLATOR ALIGNMENT

Complete oscillator alignment may not be necessary. If the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A15. It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel. If adjustment of A15 will not bring all channels well within the range of the fine tuning control, it will be necessary to adjust the channel strip adjustment screw for each channel that is off frequency. The channel oscillator adjustment screws are reached through a hole just to the left and above the channel switch shaft (hole extends through UHF tuner).
The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A16	Adjust to place sound marker in trap notch as in Fig. 8. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A17	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A18	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A19	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A20	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A21	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A22	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A23	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A24	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A25	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A26	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A27	

IF WAVE TRAP ADJUSTMENT

The IF wave trap should be tuned to minimize interference caused by signals which fall within the video IF bandpass (40-48MC). Tune in a TV station on which interference is noted and adjust A28 for MINIMUM interference in the picture.

UHF TUNER ALIGNMENT

The UHF portion of this receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

RADIO ALIGNMENT

Remove radio chassis from cabinet.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Use an insulated alignment screwdriver for adjusting.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

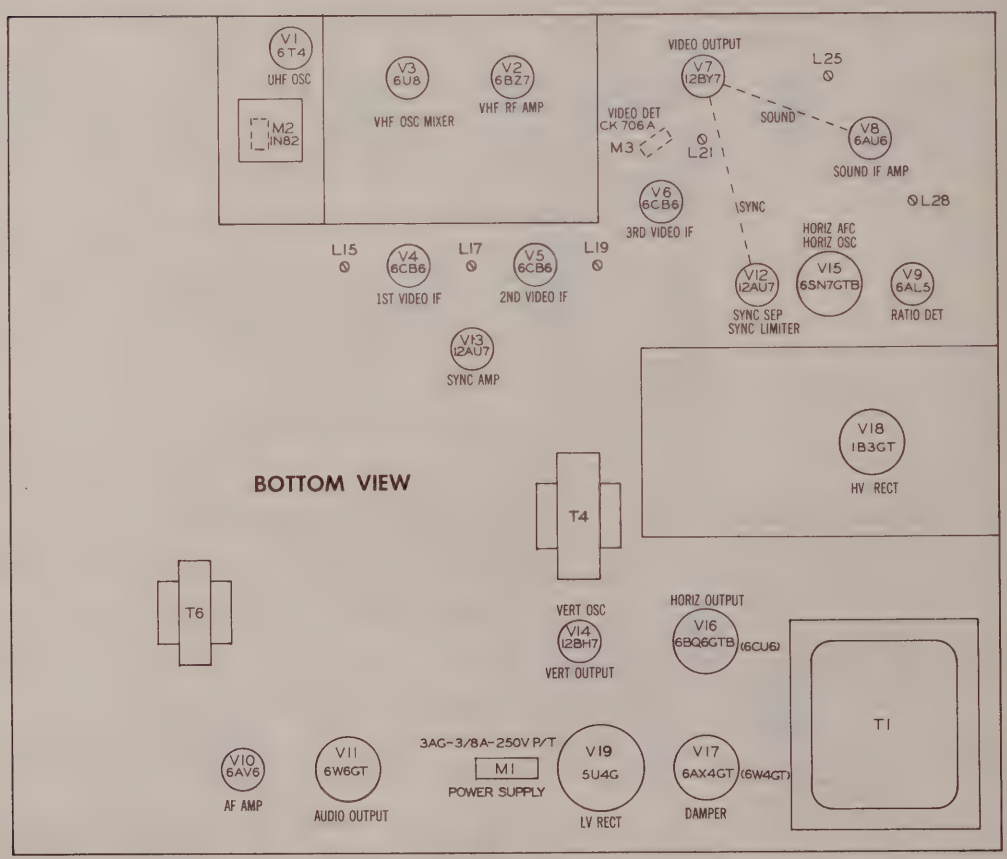
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
15.	.1MFD	High side to antenna lug on tuning gang. Low side to B- thru a .1MFD capacitor.	455KC (400%Mod)	Radio	Tuning gang fully open.	Across voice coil	A29, A30 A31, A32	Adjust for maximum output.
16.		Loop	1500KC	"	Tune to 1500KC signal	"	A33	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
17.		"	"	"	"	"	A34	"

OLYMPIC MODELS 21CZ57, 21CZ72, 21DZ73, 21KZ23, 21KZ25, 22KZ39, 21TZ56, 22DZ Series (Chassis "Z")

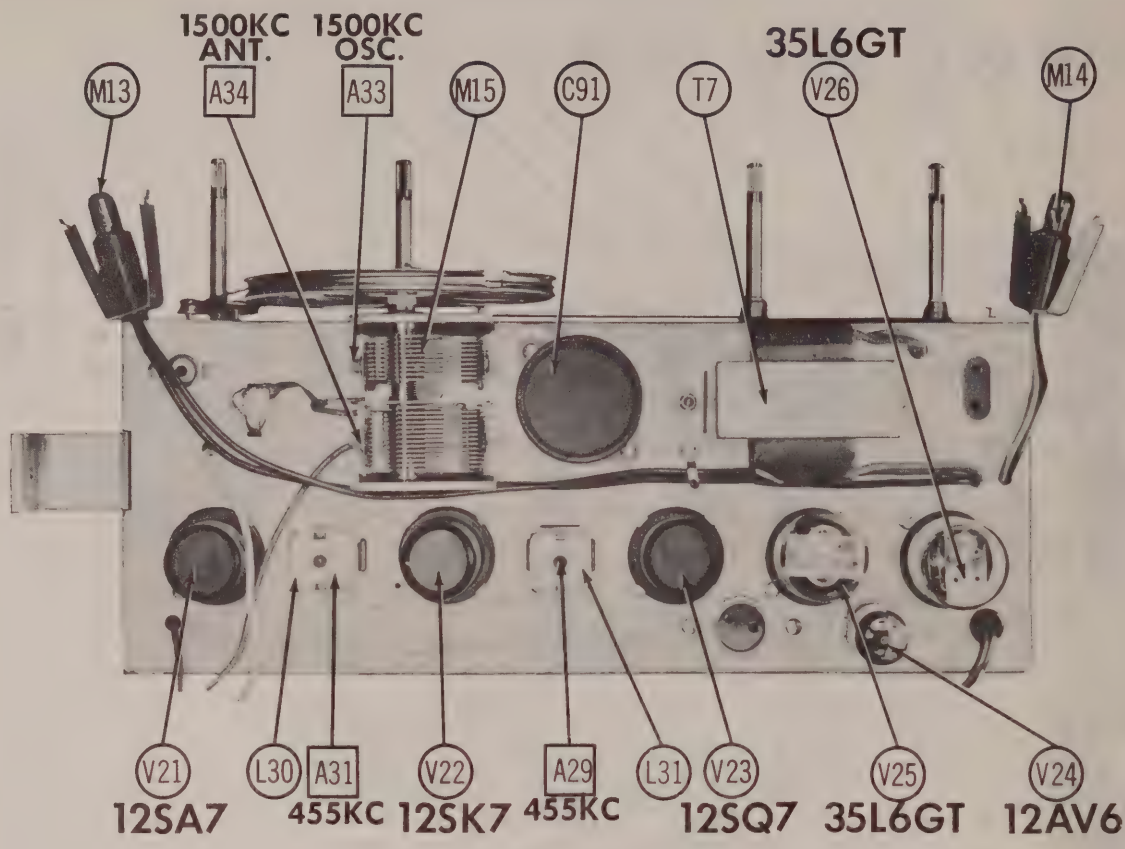
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6T4	*■5. 5KΩ	8.2 KΩ	0Ω	. 1Ω	0Ω	8. 2KΩ	*■5. 5KΩ		
V 2	6BZ7	†1KΩ	160KΩ	INF.	. 1Ω	0Ω	INF.	1Meg	0Ω	0Ω
V 3	6U8	■3. 3KΩ	200KΩ	†100KΩ	. 1Ω	0Ω	†8. 2KΩ	0Ω	0Ω	10KΩ
V 4	6CB6	1Meg	68Ω	0Ω	. 1Ω	■330Ω	■330Ω	0Ω		
V 5	6CB6	1Meg	47Ω	0Ω	. 1Ω	■330Ω	■330Ω	0Ω		
V 6	6CB6	. 2Ω	150Ω	0Ω	. 1Ω	■330Ω	■330Ω	0Ω		
V 7	12BY7	200Ω	1. 5Meg	0Ω	. 1Ω	. 1Ω	0Ω	†5KΩ	†33KΩ	0Ω
V 8	6AU6	100KΩ	0Ω	0Ω	. 1Ω	■1KΩ	■47KΩ	0Ω		
V 9	6AL5	1Meg	1Meg	0Ω	. 1Ω	10KΩ	0Ω	10KΩ		
V 10	6AV6	10Meg	0Ω	0Ω	. 1Ω	0Ω	0Ω	†100KΩ		
V 11	6W6GT	TP	0Ω	†700Ω	†530Ω	150KΩ	NC	. 1Ω	45KΩ	
V 12	12AU7	■35KΩ	2. 2Meg	0Ω	. 1Ω	. 1Ω	■22KΩ	56KΩ	■35KΩ	0Ω
V 13	12AU7	■13KΩ	1Meg	0Ω	. 1Ω	. 1Ω	NC	NC	NC	0Ω
V 14	12BH7	▲2. 7KΩ	2. 2Meg	2. 2KΩ	0Ω	0Ω	▲2Meg	2. 2Meg	0Ω	. 1Ω
V 15	6SN7GTB	500KΩ	▲100KΩ	0Ω	1. 5Meg	▲100KΩ	400KΩ	0Ω	. 1Ω	
V 16	6BQ6GTB/ 6CU6	TP	0Ω	TP	†8. 4KΩ	470KΩ	TP	. 1Ω	0Ω	TOP CAP ▲37Ω
V 17	6AX4GT	NC	NC	110KΩ	NC	†200Ω	NC	. 1Ω	0Ω	
V 18	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲600Ω
V 19	5U4G	NC	100KΩ	TP	36Ω	TP	34Ω	NC	100KΩ	
V 20	21ALP4A	0Ω	220KΩ	PIN 6 0Ω	PIN 10 ▲35KΩ	PIN 11 ■360KΩ	PIN 12 . 1Ω			

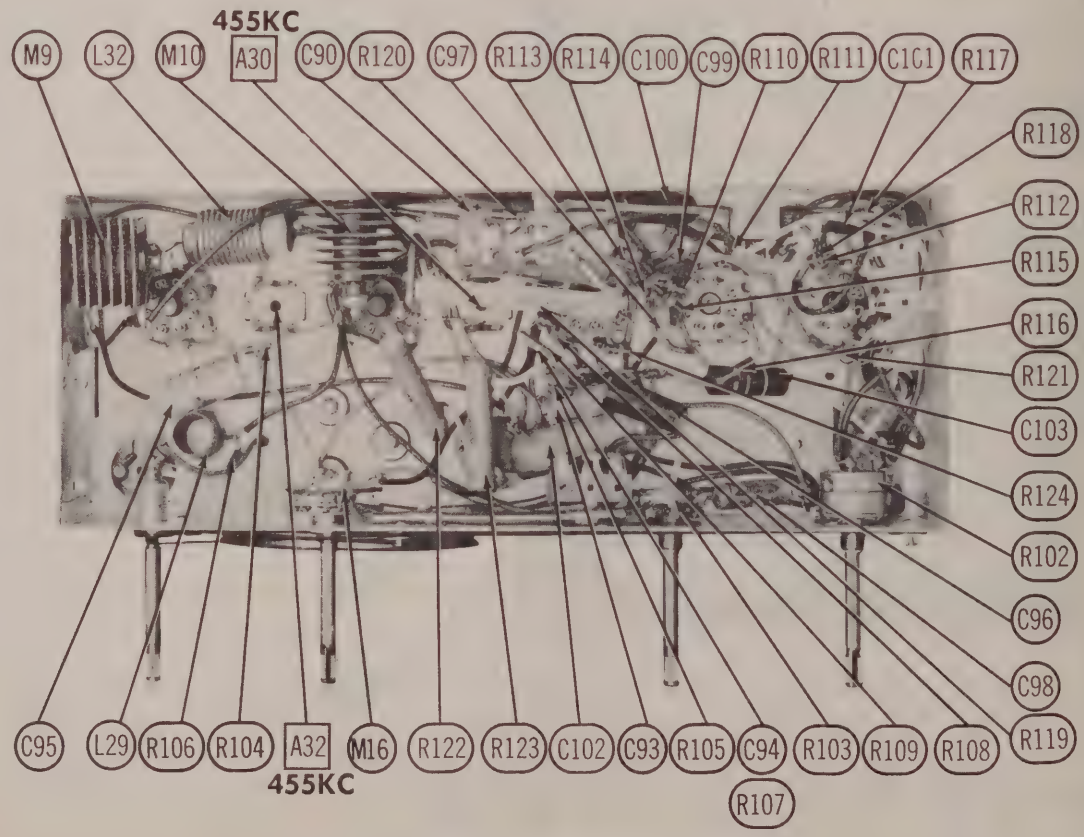
*MEASURED IN "UHF" POSITION.
■MEASURED FROM 125V LINE.
†MEASURED FROM PIN 2 OF V19.
TP-TIE POINT.
NC-NO CONNECTION.



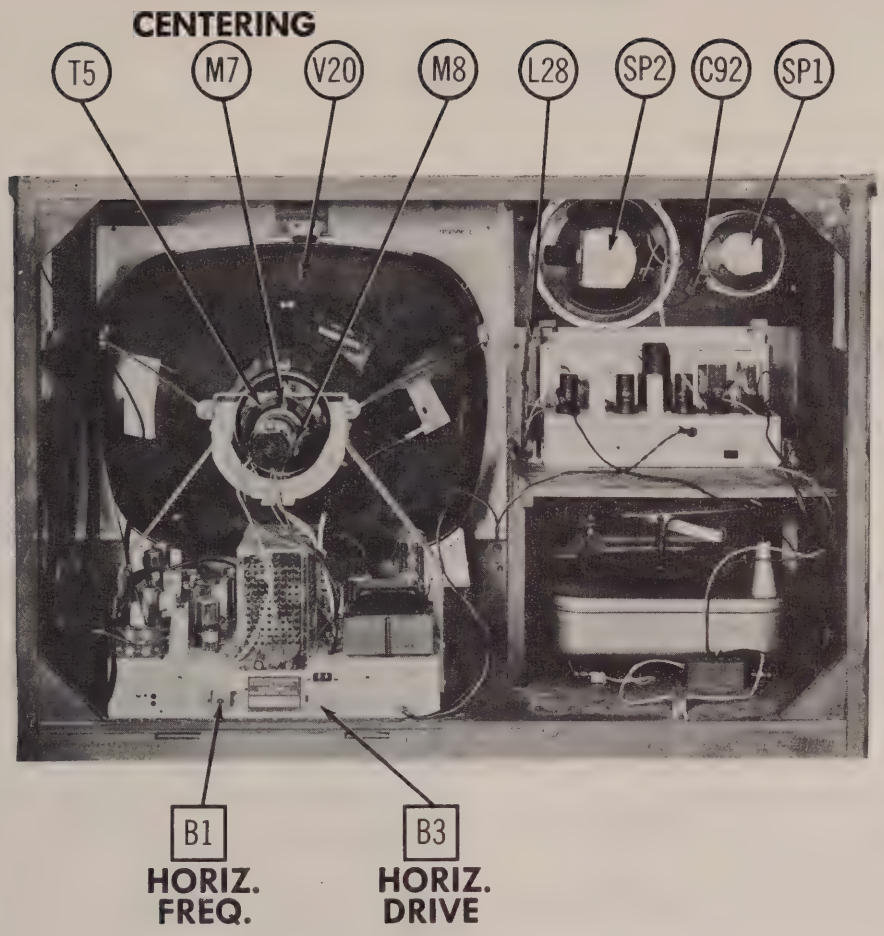
TUBE PLACEMENT CHART



RADIO CHASSIS-TOP VIEW



RADIO CHASSIS-BOTTOM VIEW



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern. Connect a short jumper across terminal "C" and "D" of L29.

Set the horizontal hold control fully clockwise. Adjust the horizontal frequency slug (B1) until the picture falls into sync.

Remove the jumper from terminals "C" and "D" of L29. Connect the high side of vertical amplifier of scope thru 5MMF to terminal "C" of L19.

Adjust the horizontal phasing slug (B2) for a waveform similar to Fig. 9 with broad and narrow peaks of equal height. If necessary, during adjustment of B2, keep picture in sync with the horizontal hold control or B1.

Remove scope and retouch B1 for the following conditions:

① At full clockwise position of horizontal hold control a blanking bar or picture jitter should be evident.

② At full counter clockwise position of horizontal hold control, picture should just be at the point of losing sync.

Adjust the horizontal drive trimmer (B3) clockwise as far as possible without the presence of vertical white lines or compression of the picture. If neither of these conditions appear, adjust B3 for a picture slightly wider than necessary to fill the picture mask horizontally.

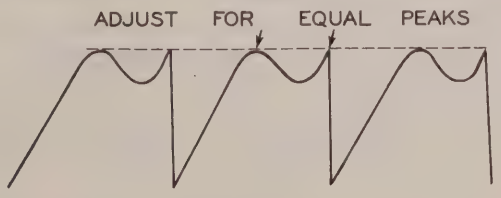


FIG. 9

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage."

INSUFFICIENT SWEEP

Check by substitution V16, V17 and V19. Check adjustment B3. Check T3, T5A, C81, R94 and other associated components.

DRIVE LINES

Check by substitution V16 and V17. Check adjustment B3. Check T3, T5A, C80, C81, R94 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V16 and V17. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines."

PIE CRUST EFFECT

Check by substitution V15, V16 and V17. Check C75 and C76 for open. Check C77, R81, R78, L27 and other associated components.

XMAS TREE EFFECT

Check by substitution V15, V16 and V17. Check T3 and T5 for internal arcing. Check L27, C72, C73, C74, C78, C79, R87 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V14. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R72, R73 and other associated components.	Check T2, C65, C67, R67, R71, R5 and other associated components.

INSUFFICIENT SWEEP

Substitute V14. Check height and vertical linearity controls for proper operation. Check R71, T4 and other associated components.

COMPRESSED AT BOTTOM

Substitute V14. Check C65, C67, R71, R5, T2 and other associated components.

COMPRESSED AT TOP

Substitute V14. Check R72, R3, C4B, T4 and other associated components.

FOLDS

Substitute V14. Check C66, C67, R70, R73, T4, T5B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V12 and V13. Check C61, C63, R57, R58, R60, R63 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V14. Check vertical integrator network. Check R68, R67, R4, C65, T2 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Substitute V15. Check C71, C77, C75, C76, R81, R2, L27 and other associated components.

HORIZONTAL BENDING

Check by substitution V12, V13 and V15. Check components associated with V15.

VIDEO

LOSS OF VIDEO

Substitute V7. Check C49, C50, C51, C52, R37, R41 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A8. Check video IF alignment.

POOR CONTRAST

Substitute V7. Check contrast control. Check R39, R41, C49, C52, L24, L25 and other associated components.

NEGATIVE PICTURE

Substitute V7. Check picture tube. Check C49, C52, L24, L25 and other associated components.

SMEAR

Substitute V7. Check L20, L21, L22, L24, L25, C49, C52 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V2, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9, V10 and V11. Check stages V10 and V11 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C59, C60, C3, C4A, R52, R54, T6, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A-11 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or no Sound."

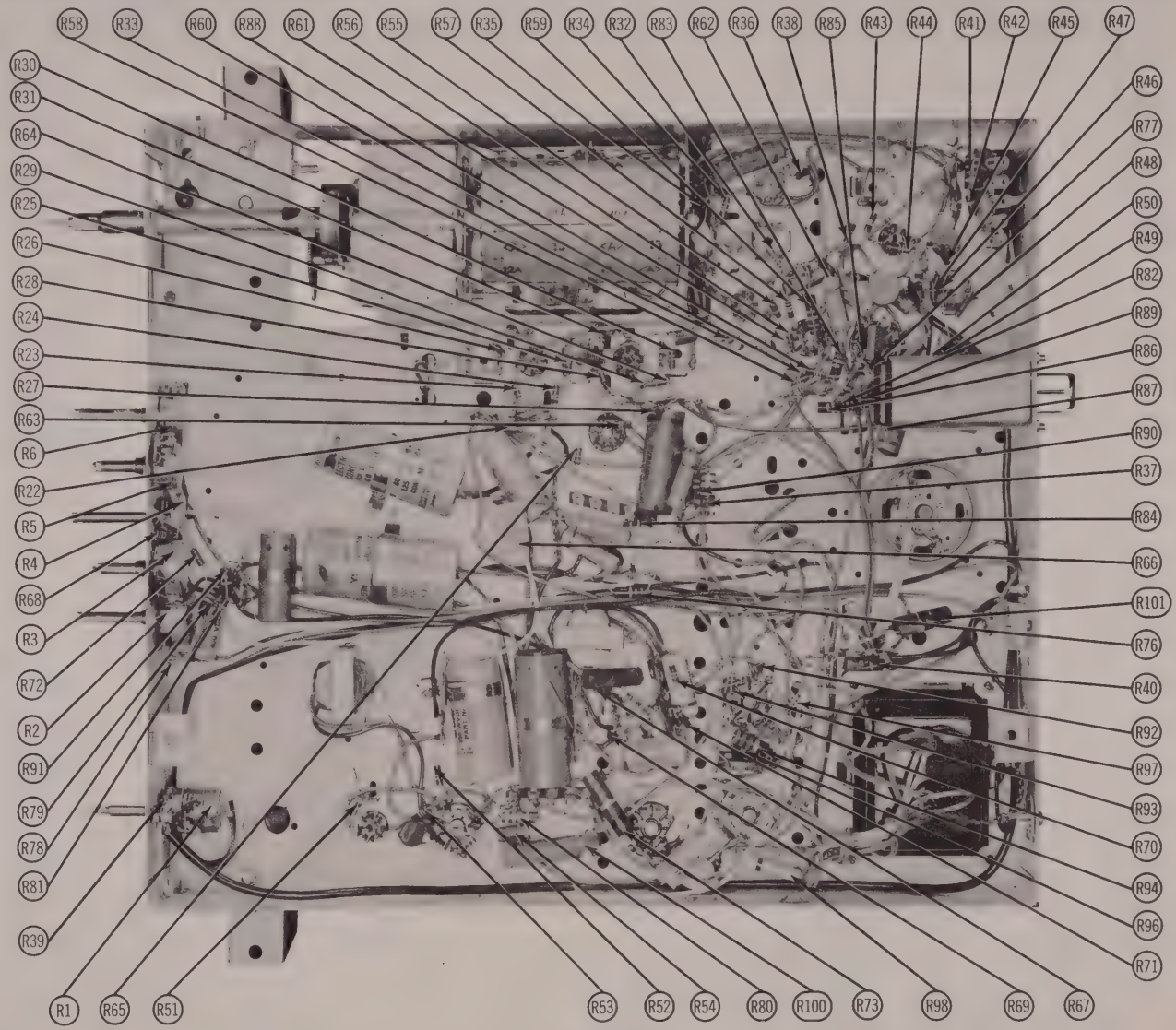
POWER

DEAD SET

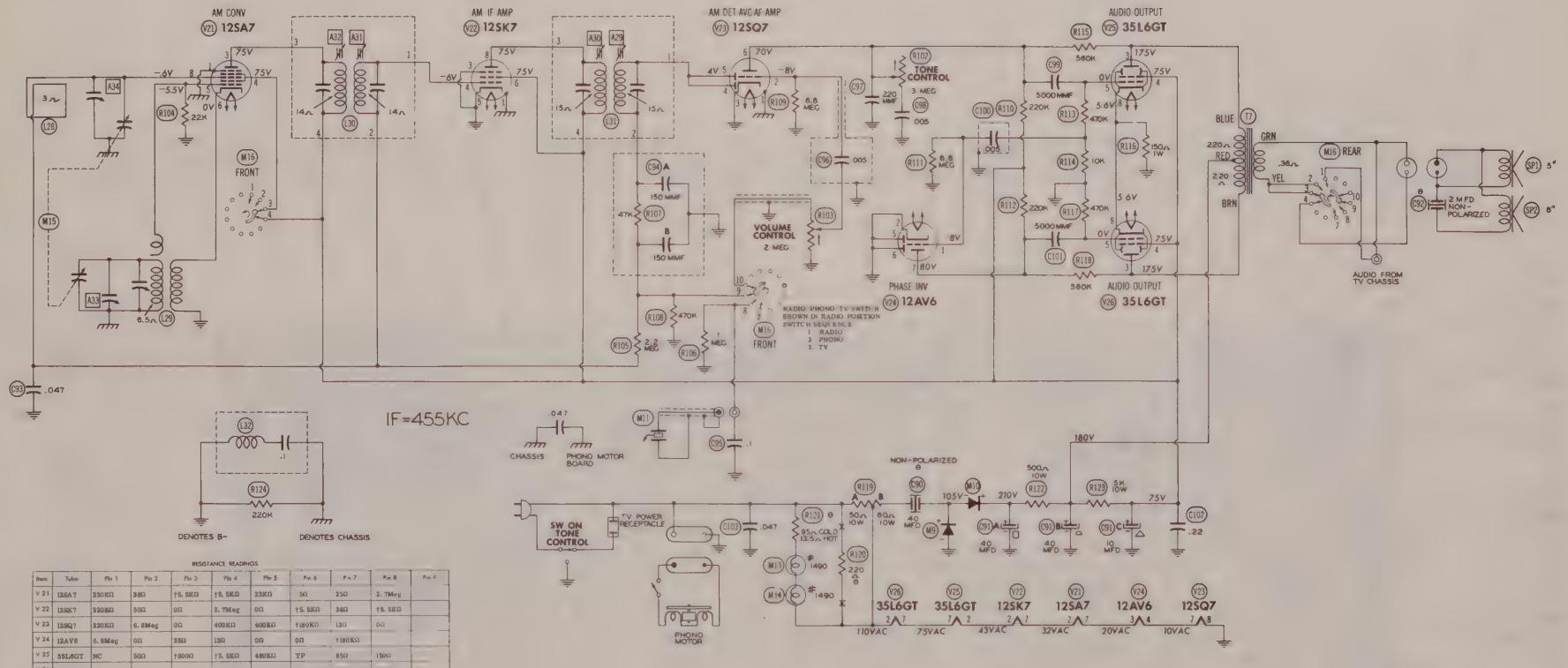
If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, substitute V19. Check B+ filter and decoupling network.

SMALL AND/ON DIM PICTURE

Substitute V19. Check B+ filter and decoupling network.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 21	12SA7	230KΩ	38Ω	†5. 5KΩ	†5. 5KΩ	33KΩ	5Ω	25Ω	2. 7Meg	
V 22	12SK7	230KΩ	50Ω	0Ω	2. 7Meg	0Ω	†5. 5KΩ	38Ω	†5. 5KΩ	
V 23	12SQ7	230KΩ	6. 8Meg	0Ω	400KΩ	400KΩ	†180KΩ	13Ω	0Ω	
V 24	12AV6	6. 8Meg	0Ω	38Ω	13Ω	0Ω	0Ω	†180KΩ		
V 25	35L6GT	NC	50Ω	†800Ω	†5. 5KΩ	480KΩ	TP	85Ω	150Ω	
V 26	35L6GT	NC	130Ω	†800Ω	†5. 5KΩ	470KΩ	NC	85Ω	150Ω	

ALL MEASUREMENTS TAKEN IN "RADIO" POSITION.
†MEASURED FROM OUTPUT OF M10.
NC-NO CONNECTION.
TP-TIE POINT.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

OLYMPIC MODELS 21CZ57, 21CZ72, 21DZ73, 21KZ23, 21KZ25, 21KZ39, 21TZ56, 21DZ Series (Chassis "Z")

RADIO SCHEMATIC

TV PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		OLYMPIC PART No.	STANDARD REPLACEMENT		
V1	UHF Osc.	6T4	6T4	7DK	
V2	RF Amp.	6BZ7	6BZ7	9AJ	
V3	Mixer-Osc.	6U8	6U8	9BD	
V4	1st Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Output	12BY7	12BY7	9BF	
V8	Sound IF Amp.	6AU6	6AU6	7BK	
V9	Ratio Det.	6AL5	6AL5	6BT	
V10	AF Amp.	6AV6	6AV6	7BT	
V11	Audio Output	6W6GT	6W6GT	7AC	
V12	Sync Sep. - Sync Limiter	12AU7	12AU7	9A	
V13	Sync Amp.	12AU7	12AU7	9A	
V14	Vert. Osc. - Vert. Output	12BH7	12BH7	9A	
V15	Horiz. AFC-Horiz. Osc.	6SN7GTB	6SN7GTB	8BD	
V16	Horiz. Output	6BQ6GTB/6CU6	6BQ6GTB/6CU6	6AM	
V17	Damper	6AX4GT	6AX4GT	4CG	6W4GT or 6AX4GT may be used with HV transformer TR-2771-1. Use 6AX4GT only with HV transformer TR3599.
V18	HV Rect.	1B3GT	1B3GT	3C	
V19	LV Rect.	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	OLYMPIC PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V20	21ALP4A ①	21ALP4A ① 21ALP4	21ALP4A ①	21ALP4A ② 21ALP4 21ALP4B ②	21ALP4A ① 21ALP4	12L 12L 12L	① Aluminized ② Silver screen

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	OLYMPIC PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	60	350	CO3380	FP242.5	TM-D60-400	D-190	
B	60	350		TC60	TD-4-450	FM-4504	
C	4	350					
C2	4	50	CO2756	TC30	TD-4-50	MMT-0505	
C3	50	250	CO2068	TC59	TD-50-450	FM-2540	
C4A	60	200	CO3856	TC68	TD-60-350	D-322	Note 1
B	125	50		TC495	TD-150-50		
C5	20	450	CO2560	TC75	TD-20-450	FM-4520	
C6	4	450	CO1056	TC70	TD-4-450	FM-4504	

Note 1. Mfgr lists C4A ⓐ 40MFD (C4 part #CO3596).

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	OLYMPIC PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C7	2-5.5			829-6			
C8	800			DD-801	831-801	DC-521	
C9	800			DD-801	831-801	DC-521	
C10	1000						
C11	1000						
C12	33			TCZ-33	NP0L-330	ZT-5433	
C13	.8-3.5						
C14	6.8			TCZ-6R8	NP0A-6R8	ZT-5568	
C15	800			DD-801	831-801	DC-521	
C16	3.6						
C17	.8-3.5						
C18	1000						
C19	47			DD-470	831-470	UC-5447	
C20	1.5			TCZ-1R5	NP0A-1R5	ZT-5515	
C21	1000						
C22	47			MFT-50			
C23	.8-3.5						
C24	10						
C25	7.5						
C26	800			DD-801	831-801	DC-521	
C27	1000						
C28	1-4			829-4	3115-01-10	CT551	
C29	220			DD-221	811-221	UC-5322	
C30	68			TCN-68	N750L-680		
C31	1000						
C32	800			DD-801	831-801	DC-521	
C33	220		CCD221M	DD-221	811-221	UC-5322	
C34	1000		CCD102X	DD-102	801-001	DC-521	
C35	.22	400	CO-H-2224			PT4022	
C36	470		CCD471M	DD-471	831-471	UC-5347	
C37	1000		CCD102X	DD-102	801-001	DC-521	
C38	1000		CCD102X	DD-102	801-001	DC-521	
C39	1000		CCD102X	DD-102	801-001	DC-521	
C40	1000		CCD102X	DD-102	801-001	DC-521	
C41	470		CCD471M	DD-471	831-471	UC-5347	
C42	1000		CCD102X	DD-102	801-001	DC-521	
C43	1000		CCD102X	DD-102	801-001	DC-521	
C44	470		CCD471M	DD-471	831-471	UC-5347	
C45	1000		CCD102X	DD-102	801-001	DC-521	
C46	1000		CCD102X	DD-102	801-001	DC-521	
C47	1000		CCD102X	DD-102	801-001	DC-521	
C48	4.7		CO1083	TCZ-4R7	NP0A-4R7	ZT-5547	
C49	.047	400	CO-H-4473	DF-503		PT4147	
C50	330		CCD331M	DD-331	811-331	UC-5333	
C51	1000		CCD102X	DD-102	801-001	DC-521	
C52	.1	400	CO-H-4104	DF-104		PT401	

PROPERTY OF
L. F. BLANKENSHIP
3924 NEWTON ST
DENVER, COLORADO

CAPACITORS (cont)

ITEM No	RATING CAP	RATING VOLT	REPLACEMENT DATA OLYMPIC PART No	CENTRALAB PART No	ERIE PART No	MALLORY PART No	NOTES
C53	10000		CCD103X	DD-103	811-01	DC-5U	
C54	10000		CCD103X	DD-103	811-01	DC-5U	
C55	330		CCD331M	DD-331	811-331	UC-5333	
C56	330		CCD331M	DD-331	811-331	UC-5333	
C57	330		CCD331M	DD-331	811-331	UC-5333	
C58	.0022	600	CO-H-6202	D6-222	GP2-333-222	PT6222	
C59	5000		CCD502X	DD-502	811-005	DC-525	
C60	10000		CCD103X	DD-103	811-01	DC-5U	
C61	.0022	600	CO-H-6202	D6-222	GP2-333-222	PT6222	
C62	330		CCD331M	DD-331	811-331	UC-5333	
C63	.0047	600	CO-H-6472	D6-472	GP2-333-472	PT6247	
C64A	2000					DC-522	
B	5000		*PC2435	*PC-100	*1405-01	DC-525	
C	5000					DC-525	
C65	.0047	600	CO-H-6472K			MCB465	
C66	.047	400	CO-H-4473	DF-503		PT4147	
C67	.1	400	CO-H-4104	DF-104		PT401	
C68	.02	400	CO-H-4203	DF-203	817-02	PT412	
C69	5000		CCD502X	DD-502	811-005	DC-525	
C70	.0022	600	CO-H-6202	D6-222	GP2-333-222	PT6222	
C71	47	500	RCM20C470K	D6-470	831-470	MCB225	
C72	47	500	RCM20C470K	D6-470	831-470	MCB225	
C73	47	500	RCM20C470K	D6-470	831-470	MCB225	
C74	.047	400	CO-H-4473	DF-503		PT4147	
C75	.02	400	CO-H-4203	DF-203	817-02	PT412	
C76	.47	200	CO-H-2474			PT4047	
C77	.047	400	CO-H-4473	DF-503		PT4147	
C78	120	1000					Note 2
C79	.01	600	CO-H-6103	D6-103	GP2-333-103	PT611	
C80	.001	600	CO-O-6102K	D6-102	GP2L-102	PT621	
C81	.001	600	CO-O-6102K	D6-102	GP2L-102	PT621	
C82	.047	400	CO-H-4473	DF-503		PT4147	
C83	.22	200	CO-H-4224			PT4022	
C84	.1	400	CO-H-4104	DF-104		PT401	
C85	.002	600	CO-H-6202	D6-202	GP2-333-202	PT622	Note 3
C86	47	3000	CO3S25	D330-470	3KV-470	DC30447	Notes 4,5
C87	100	3000	CO3T81	D330-101	3KV-101	DC3031	Note 4
C88	56	2000	CCD560K	D30-560	3KV-560	DC30456	
C89	.01	600	CO-B-6103	DD-103	GP2-333-103	PT611	

Note 2. Some versions use 180MMF in this application (part #SCM40C181K).
Note 3. Used only when V17 is a 6W4GT.
Note 4. Not used in some versions.
Note 5. Some versions use 100MMF in this application.
♦ Items C64A, C64B, C64C, R66A, R66B and R66C are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA OLYMPIC PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1500Ω	½	PT-3512	QJ-766♦	RTV-515	F1-7	UF152R	Picture (Panel)
B	1Meg					R2-53	UR16A †	Volume (Rear) Attach to R1A.
C	Switch					KB-1	US-26	Attach to R1B.
R2A	50KΩ	½	PT-2288-2	QJ1-123	A47-50K-S	AB-31	U-35	Horizontal Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A.
R3A	5000Ω	½	PT-2271-2	QJ1-114	A47-5000-S	AB-10	SU-14	Vertical Linearity
B	Shaft		Not Req.	RQ	KSS-3	AK-4	Not Req.	Attach to R3A.
R4A	1Meg	½	PT-2280-3	QJ1-137	A47-1Meg-S	AB-59	U-54	Vertical Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R4A.
R5A	2.5Meg	½	PT-2272-2	QJ1-239	A47-2.5Meg-S	AB-53	U-255	Height
B	Shaft		Not Req.	RQ	KSS-3	AK-4	Not Req.	Attach to R5A.
R6A	500K	½	PT-2270-2	QJ1-133	A47-500K-S	AB-59	U-50	Brightness
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R6A.

♦CONCENTRIKIT EQUIVALENT; K-2 KIT, BASE ELEMENTS AND SHAFTS; B17-109, P1-106 (Panel)
B13-137, R1-122 (Rear)
78-1, Switch
†Universal Replacement (Mallory Exact Duplicate Part No. UE1895).

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA OLYMPIC PART No.	IRC PART No.	NOTES
R7	8200Ω	½	REB822K		
R8	2200Ω	1		BTS-2200	
R9	47KΩ	½	REB473M		
R10	22KΩ	½	REB223M		
R11	270KΩ	½			
R12	180KΩ	½	REB184KA		
R13	150KΩ	½			
R14	3300Ω	1			
R15	10KΩ	½	REB103K		
R16	100KΩ	½	REB104K		
R17	100KΩ	½	REB104K		
R18	15KΩ	½	REC153M		
R19	100KΩ	½	REB104K		
R20	8200Ω	½			
R21	680Ω	½			
R22	100Ω	½	REB101M	BTS-1000	
R23	10KΩ	½	REB103K		
R24	330Ω	½	REB331M	BTS-330	
R25	10KΩ 5%	½	REB103K		
R26	68Ω	½	REB680M	BTS-68	
R27	1000Ω	½	REB102M	BTS-1000	
R28	330Ω	½	REB331M	BTS-330	
R29	330Ω	½	REB331M	BTS-330	
R30	22KΩ	½	REB223K		
R31	47Ω	½	REB470M	BTS-47	
R32	330Ω	½	REB331M	BTS-330	
R33	150Ω	½	REB151K	BTS-150	
R34	5600Ω	½	REB562K		
R35	1Meg	½	REB105K		
R36	1.5Meg	½	REB155K		
R37	33KΩ	2	RED333M		
R38	22KΩ	½	REB223M		
R39	1500Ω	½	REB152M		
R40	220KΩ	½	REB224M		
R41	4700Ω	2	RED472K		
R42	220K	½	REB224M		
R43	100KΩ	½	REB104M	BTS-100K	
R44	47KΩ	½	REB473M	BTS-47K	
R45	1300Ω	½	REB102M	BTS-1000	
R46	150Ω	½	REB151M	BTS-150	
R47	22KΩ	½	REB223M	BTS-22K	
R48	10Meg	½	REB106M	BTS-10Meg	
R49	10KΩ	½	REB103K	BTS-10K	
R50	10KΩ	½	REB103K	BTS-10K	
R51	10Meg	½	REB106M	BTS-10Meg	
R52	100KΩ	½	REB104K	BTS-100K	
R53	330KΩ	½	REB334KA	RTS-330K	
R54	330Ω	2	RED331M	BTD-330	
R55	220KΩ	½	REB224M		
R56	2.2Meg	½	REB225K		
R57	47KΩ	½	REB473K		
R58	220KΩ	½	REB224K		
R59	56KΩ	1	REC563K		
R60	22KΩ	½	REB223K		
R61	22KΩ	½	REB223K		
R62	1Meg	½	REB105K		
R63	10KΩ	½	REB103K		
R64	2700Ω	½	REB272K		
R65	82KΩ	½	REB823K		
R66A	22KΩ	½			
B	8200Ω	½	*PC2435		
C	8200Ω	½			
R67	1.5Meg	½	REB155K		
R68	330KΩ	½	REB334M	BTS-330K	
R69	2.2Meg	½	REB225K		
R70	12KΩ	½	REB123K		
R71	1Meg	½	REB105K		
R72	560Ω	½	REB561K		
R73	1000Ω	2	RED102M		
R74	560Ω	½	REB561K		

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA OLYMPIC PART No.	IRC PART No.	NOTES
R75	560Ω	½	REB561K		
R76	22KΩ	½	REC223M		
R77	330KΩ	½	REB334KA		
R78	82KΩ	½	REB823K		
R79	68KΩ	½	REC683KA		
R80	47KΩ	½	REC473M	BTA-47K	
R81	150KΩ	½	REB154KA		
R82	820KΩ	½	REC824KA		
R83	82KΩ 5%	½	REC823JA		
R84	3900Ω	½	REB392K		
R85	150KΩ 5%	½	REC154JA		
R86	330KΩ 5%	½	REC334JA		
R87	8200Ω	½	REB822K		
R88	180KΩ	½	REB184KA		
R89	22KΩ	½	REB223M		
R90	68KΩ	1	REC683KA		
R91	22KΩ	1			Note 1
R92	470KΩ	½	REB474M		
R93	47Ω	½	REB470M		
R94	8200Ω	2	RED822K		
R95	2700Ω	½	REB272K		
R96	100KΩ	½	REB104K		
R97	47KΩ	½	REB473M		
R98	33Ω	1	REC330M	BW1-33	
R99	3.3Ω	1	RE33XM1		Note 2
R100	200Ω	10	RE3649	PW10-200	
R101	100KΩ	1	REC104M	BTA-100K	

Note 1. Some versions use a 15KΩ 1W resistor in this application.
Mfgr. Part # REC153M.
Note 2. Not used in some versions.
♦ Items C64A, C64B, C64C, R66A, R66B, R66C are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING PRI	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No	Stancor PART No.	Thordorson PART No.	Triad PART No.
T1	117VAC @ 1.56A	600VCT @ .210ADC	5VAC @ 3A	TR-2770		P-2836		P-8335①		R-39BC ①
	SEC. 3	SEC. 4	SEC. 5							
	6.3V @ 1.2A	6.3V @ 8A								

① Drill new mounting holes.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No	Ram PART No.	Stancor PART No.	Thordorson PART No.	Triad PART No.
T2	Vert. Osc. Trans.	TR-1473	B6702	A-3003	209TI ①	V405	A-8125	26A03	A-97X
T3	Horiz. Output Trans.	TR-3599	FB41I*	HVO-9*	225TI*	X080*	A-8252*	FLY-14*	D-19*
		TR-2771-1 ②	FB41I*	HVO-9*	225TI*	X080*	A-8252*	FLY-14*	D-19*
T4	Vert. Output Trans.	TR-3689	Z1900 ④	A-3039 ① ③	226TI ① ③	V312 ① ③	A-8141 ① ③	26854 ① ⑤	A-104X ① ③
T5A	Yoke (90°) Horiz. (18.5 MH)	CL-3800	DF607 ⑤	MDF-92 ⑤			DY-18A ⑤	Y-16 ⑤	Y-41-1 ⑤
B	Vert. (41MH)								

① Drill new mounting holes.
② Alternate horiz. output trans. of trans.
③ Connect blue lead of trans. to plate; connect red lead of trans. to black & white lead of yoke, then to junction of resistor R73, and capacitor C5 (B+). Remove blue & white lead of yoke from ground, and connect to green lead of trans.
④ Use 18 to 1 turns ratio.
⑤ Connect horiz. damping network across terms #3 & #7. Use original if necessary.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordorson Replacement Connections	Triad Replacement Connections
9	9	9	9	9	9	9	9
8	8	8	8	8	8	8	8
7	8	8	7	7	7	7	7
5	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.
4	N.C.	4	N.C.	4	N.C.	4	N.C.
3	3	3	3	3	3	3	3
1	1	1	1	1	1	1	1
Special Notes →	⑥ ⑦	⑥ ⑧	⑤ ⑥	⑥	⑦	⑥	⑦

⑥ Connections for Part No. TR-2771-1.
⑦ Connections for Part No. TR-3599.
⑧ Remove horiz. centering resistor R96, & bypass capacitor C83 from circuit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	OLYMPIC PART No	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordorson PART No.	Triad PART No.	NOTES
T6	2.4KΩ	4.8Ω	TR-2766-1	Z1101	A-3025	A-3332	26S58 ①	S-12X	① Drill one new mounting hole.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	OLYMPIC PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	UHF Ant. Coil	0ΩCT						
L2	Fil. Choke	0Ω						
L3	Fil. Choke	0Ω						
L4	Cathode Choke	0Ω						
L5	UHF Mixer Coil	0Ω						
L6	UHF Osc. Coupling Coil	0Ω						
L7	UHF IF Output	.2ΩCT						
L8A	VHF Ant. Coil	0Ω	0Ω					
B	UHF IF Coil	0Ω						
L9	Neut. Coil	0Ω						
L10A	VHF RF Mixer Grid, Osc. Coil	0Ω	0Ω					
B	UHF IF Coil	0Ω	0Ω					Includes 5.6KΩ resistor
L11	Fil. Choke	0Ω						
L12	Conv. Plate	.1Ω						
L13	1st Video IF	.2Ω		CL3497	17-5001*	TV-125*	6231*	
L14	RF Coil	2.6Ω		CL1535	19-3036	TV-180	6176	36 Microhenries
L15	2nd Video IF	.3Ω	.3Ω	CL3498	17-5002	TV-127	6232	Includes 41.25MC Trap.
L16	Fil. Choke	0Ω		CL2427	19-1001		4604	
L17	3rd Video IF	.2Ω	.2Ω	CL3499	17-4521▲	TV-128	6233	Includes 47.25MC Trap.
L18	Fil. Choke	0Ω		CL2427	19-1001		4604	
L19	4th Video IF	.3Ω	.3Ω	CL3500	17-5004	TV-125	6234	
L20	Series Peaking Coil	2.6Ω		CL1535	19-3036	TV-180	6176	36 Microhenries
L21	Series Peaking Coil	4Ω		CL3401	19-3075▲	TV-181▲	6172▲	80 Microhenries, Wound on 22KΩ resistor.
L22	Shunt Peaking Coil	8.5Ω		CL3403	19-3300▲	TV-190▲	6155▲	300 Microhenries, Wound on 1Meg resistor.
L23A	4.5MC Trap	2.1Ω						
B	Sound IF	2.1Ω		TR3386				
L24	Series Peaking Coil	7.8Ω		CL3398	19-3350♦	TV-185♦	6181♦	250 Microhenries, wound on 15KΩ resistor.
L25	Shunt Peaking Coil	8.5Ω		CL3403	19-3300▲	TV-190▲	6155▲	300 Microhenries, wound on 1Meg resistor. Tertiary Winding=.7Ω
L26	Ratio Det.	5.3Ω	2ΩCT	TR2630	17-3497	TV-115	6205	Waveform Winding=45Ω
L27	Horiz. Osc.	23Ω	57Ω	TR2294	20-1402	TV-162	6183	

* Use one winding only.
■ Drill mounting holes.
▲ Parallel with 22KΩ resistor.
▲ Parallel with 1Meg resistor.
♦ Parallel with 15KΩ resistor.

FUSES

ITEM No.	TYPE	RATING	OLYMPIC PART No. FUSE	OLYMPIC PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG P/T	3/8A 250V	FU3492		312.375 (3AG P/T 3/8A)		GJV 3/8	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	OLYMPIC PART No.	SYLVANIA PART No.	NOTES
M2	1N82A	1N82A	1N82 / 1N82A	UHF Mixer
M3	CK706A*	1N60/1N64	1N60 / 1N132	Video Detector

* Some versions may use crystal diode types 1N60 or 1N64 in this application.

MISCELLANEOUS

ITEM No.	PART NAME	OLYMPIC PART No.	NOTES
M4	Dial Light	BU-187	#1490
M5	Tuner	CL3498	VHF-UHF
M6	Trap	83A64917-3	VHF Ant. Input Filter
M7	Centering Device	PP2763	
M8	Ion Trap	PP2248	
B3	Trimmer Cap.	CT3526	Horiz. Drive (110-580MMF)
	Cabinet	CA3570	Model 21KZ23
	Cabinet	CA3580	Model 21KZ25
	Cabinet	CA3655	Model 21TZ56
	Cabinet	CA3686	Model 21CZ57
	Cabinet	CA3700	Model 21KZ39
	Cabinet	CA3923	Model 21DZ73
	Cabinet	CA3981	Model 21CZ72
	Knob	KN3543	On-off-volume - Models 21KZ39, 21TZ56M, 21CZ57, 21CZ72, 21DZ73
	Knob	KN3543-1	On-off-volume - Models 21KZ23, 21KZ25
	Knob	KN3544	Contrast - All Models
	Knob	KN3545	Channel Selector - Models 21KZ39, 21TZ56M, 21CZ57, 21CZ72, 21DZ73
	Knob	KN3545-1	Channel Selector - Models 21KZ23, 21KZ25
	Knob	KN3546	Fine tuning - All Models
	Dial	DL3547	UHF Indicator - All Models
	Safety Glass	PP3656-1	Models 21TZ56, 21CZ57, 21CZ72, 21DZ73, 22DZ122, 22DZ123, 22DZ124
	Safety Glass	PP3572-1	Models 21KZ23, 21KZ25, 21KZ39
	Safety Glass	PP3636-1	Model 22DZ101, 22DZ116, 22DZ120, 22DZ121
	Mask	PP3568-1	Green
	Mask	PP3568-3	Blonde combination models
	Mask	PP3646-2	Gold - Models 21TZ56, 21CZ57, 21CZ73, 21DZ73
	Mask	PP3637	Models 22DZ101, 22DZ116, 22DZ120, 22DZ121
	Mask	PP3646-1	Models 22DZ122, 22DZ123, 22DZ124

L. H. [redacted] SHIP
3324 [redacted] ST.
DENVER, COLORADO

RADIO PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		OLYMPIC PART No.	STANDARD REPLACEMENT		
V21	AM Conv.	12SA7	12SA7	8R	
V22	AM IF Amp.	12SK7	12SK7	8N	
V23	AM Det. -AVC-AF Amp.	12SQ7	12SQ7	8Q	
V24	Phase Invert	12AV6	12AV6	7BT	
V25	Audio Output	35L6GT	35L6GT	7AC	
V26	Audio Output	35L6GT	35L6GT	7AC	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	OLYMPIC PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C90	40	150	CO3152		TD-40-150NP		Note 6
C91A	■40	300	CO3151	FP376.8	TM-404010-450	T-165	
B	▬40	300					
C	▲10	300					
C92	2	200	CO3167		TD-2-200NP	MT-4504 * MT-4504	Note 6

Note 6. Non-polarized unit.
* Connect negative leads together.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	OLYMPIC PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C93	.047	400		DF-503		PT4147	
C94A	150	}	†PC-2478	†PC-51	†1403-02	UC-5315	
B	150	}				UC-5315	
C95	.1	400		DF-104		PT401	
C96	.005	600		D6-503	GP2-333-502	PT625	
C97	220	500		D6-221	GP2K-221	MC240	
C98	.005	600		D6-502	GP2-333-502	PT625	
C99	5000			DD-502	811-005	DC-525	
C100	.005	600		D6-502	GP2-333-502	PT625	
C101	5000			DD-502	811-005	DC-525	
C102	.22	400				PT4022	
C103	.047	400		DF-503		PT4147	

† Items C94A, C94B and R107 are combined in one unit.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	OLYMPIC PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R102A	3Meg	½	PT-2160		A47-3Meg-Z	AB-85	U-57	Tone
B	Shaft		Not Req.		KSS-3	AK-4	Not Req.	Attach to R102A.
C	Switch		Not Req.		SWE-21	KB-3	US-28	Attach to R102A.
R103A	2Meg	½	PT-567	Q13-139X	A47-2Meg-Z	ABT-80	U-55	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R103A.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	OLYMPIC PART No.	IRC PART No.	
R104	22KΩ	½		BTS-22K	
R105	2. 2Meg	½		BTS-2. 2Meg	
R106	1Meg	½		BTS-1Meg	
R107	47KΩ	½	† PC2478	BTS-47K	
R108	470KΩ	½		BTS-470K	
R109	6. 8Meg	½		BTS-6. 8Meg	
R110	220KΩ	½		BTS-220	
R111	6. 8Meg	½		BTS-6. 8Meg	
R112	220KΩ	½		BTS-220K	
R113	470KΩ	½		BTS-470K	
R114	10KΩ	½		BTS-10K	
R115	560KΩ	½		BTS-560K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	OLYMPIC PART No.	IRC PART No.	
R116	150Ω	1		BTA-150	
R117	470KΩ	½		BTS-470K	
R118	560KΩ	½		BTS-560K	
R119A	50Ω	10	‡RE-3907	PW10-50	
B	80Ω	10	‡RE-3907	PW10-75	
R120	220Ω	½		BTS-220	Note 2
R121	95Ω @ 38°C 13. 5Ω @ 104°C				Note 3
R122	500Ω	10		PW10-500	
R123	5000Ω	10		PW10-5000	
R124	220KΩ	½		BTS-220K	

Note 2. Not used in some versions.
Note 3. Special type resistor, temp. comp.
† Items C94A, C94B, R107 are combined in one unit.
‡ Items R119A, R119B are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T7	10. 2KΩ CT	4. 8Ω	TR-3159	Z1003 ①	A-2901 ①	A-3830	24S61 ①	S-55X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	OLYMPIC PART No.	QUAM PART No.	
SP1	5"	PM	11. 7Ω	SK-3147	5A15T	
SP2	8"	PM	3. 1Ω	SK-3148	8A6Z3. 2Ω	

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA OLYMPIC PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L28	Loop Ant.	3Ω		LP-3190-1				
L29	Osc. Coil	.5Ω	6.5Ω		14-1073		69-Osc.†	
L30	Input IF	14Ω	14Ω	TR-1644	16-6758	BC-352	12-C1	
L31	Output IF	15Ω	15Ω	TR-1644	16-6758	BC-353	12-C2	
L32	RF Choke	0Ω						12 turns #20 wire wound on .1MFD Cap.

† Drill mounting hole.

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	REPLACEMENT DATA OLYMPIC PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M9	.077ADC	RF3160	1005A	RS100	6S150	5P1	150	
M10	.077ADC	RF3160	1005A	RS100	6S150	5P1	150	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA OLYMPIC PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	REMARKS
M11		ACD-CJ	A-1 and A-3	46	0-1 or S-1 and 0-3	

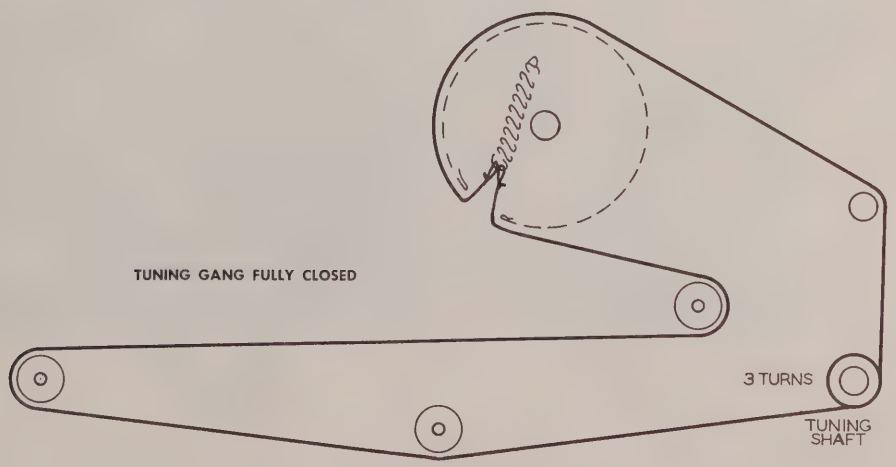
PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA OLYMPIC PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	REMARKS
M12	33 1/3-45 RPM Needle	*E-95LP or †E-90LP or ♦E-90LPD	*A-337 or †A-339 or ♦A-339D	*W-20MGA or †W-21MGS or ♦W-21MGD	* Metal † Jewel ♦ Diamond
	78RPM Needle	*E-95 or †E-90 or ♦E-90D	*C-340 or †C-345 or ♦C-345D	*W-20A or †W-21S or ♦W-21D	

MISCELLANEOUS

ITEM No.	PART NAME	OLYMPIC PART No.	NOTES
M13	Dial Light	BU-187	#1490
M14	Dial Light	BU-187	#1490
M15	Tuning Cap.	CV2681	2 Gang (24-447MMF, 30-195MMF)
M16	Switch		Selector (Rotary-wafer type)
	Knob	KN3869	Volume - Mahogany
	Knob	KN3869-1	Volume - Blonde
	Knob	KN3870	Tuning - Mahogany
	Knob	KN3870-1	Tuning - Blonde
	Knob	KN3874	Selector Switch - Mahogany
	Knob	KN3874-1	Selector Switch - Blonde
	Knob	KN3875	On-off-tone - Mahogany
	Knob	KN3875-1	On-off-tone - Blonde



RADIO DRIVE CORD STRINGING

PROPERTY OF
L. F. [illegible]NSHIP
3901 BEARL ST.
DENVER, COLORADO

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

TROUBLE SHOOTING AIDS (cont)

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V15, V16, V17 and V18. Check fuse, M1. Check waveform W13.

If Satisfactory	If Unsatisfactory
Check T3, T5A, C82, C83, C84, C85, C86, C87, R94 and other associated components.	Check L27, C78, C79, C81, R78, R79, R87, R89, R90, R91 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V16, V17 and V19. Check T3, T5A, C81, R94 and other associated components.

BLOOMING

Check by substitution V16, V17, V18 and V19. Check T2, T5A, C81, C80, R94 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video."

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or no Sound."

RASTER, NO SOUND, NO PICTURE

Check by substitution V2, V3, V4, V5, V6, V7 and V11. Check video IF components for failure or change of value. Raster, No Sound, No Picture, UHF, substitute V1.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set."

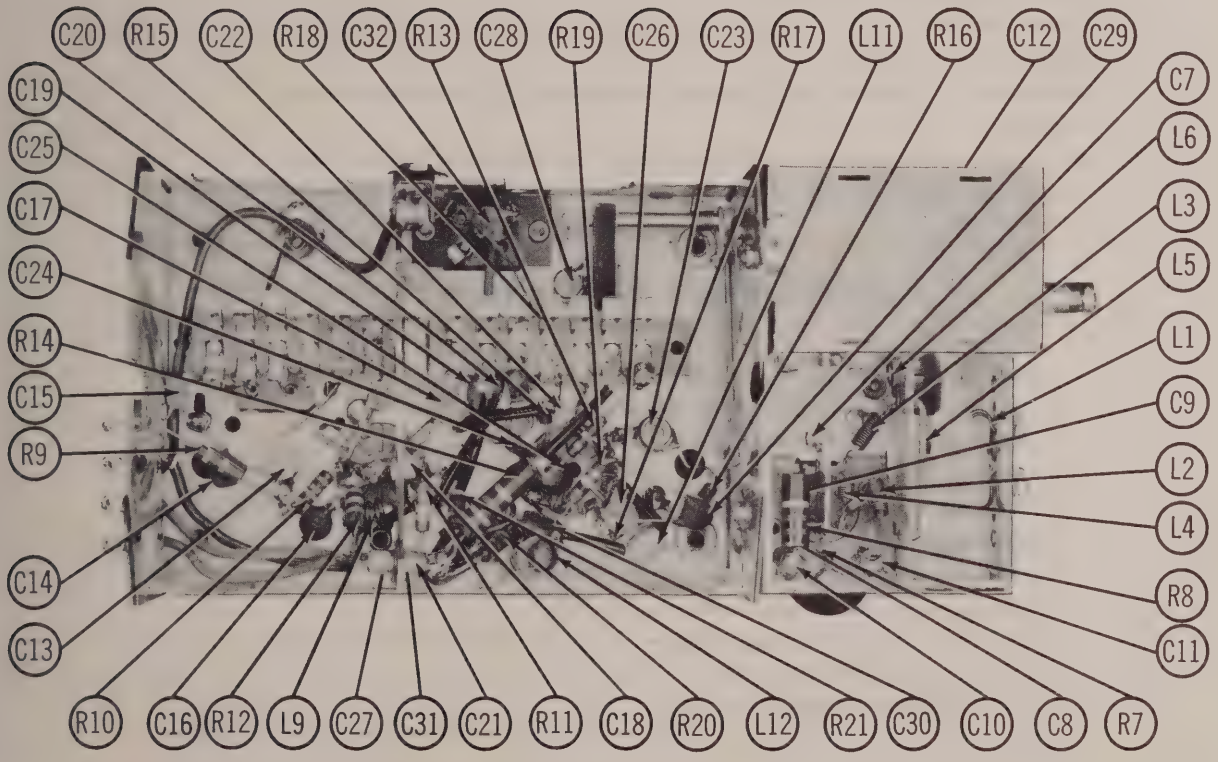
KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



RF TUNER BOTTOM VIEW

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet above and slightly to the left of the channel selector shaft.

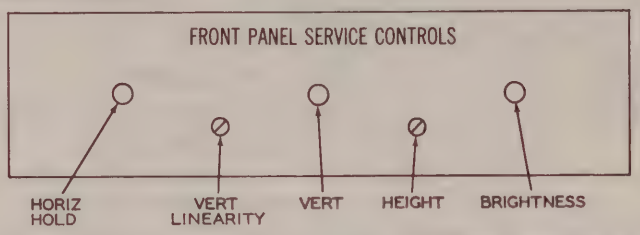
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 3 wood screws holding wood strip at the top of the safety glass. Remove wood strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator is located on the rear panel of the chassis. Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug of L29 until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L28) located on top of chassis. (See tube placement chart).

FUSES

One fuse is used for horizontal and vertical sweep circuit protection. (for location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

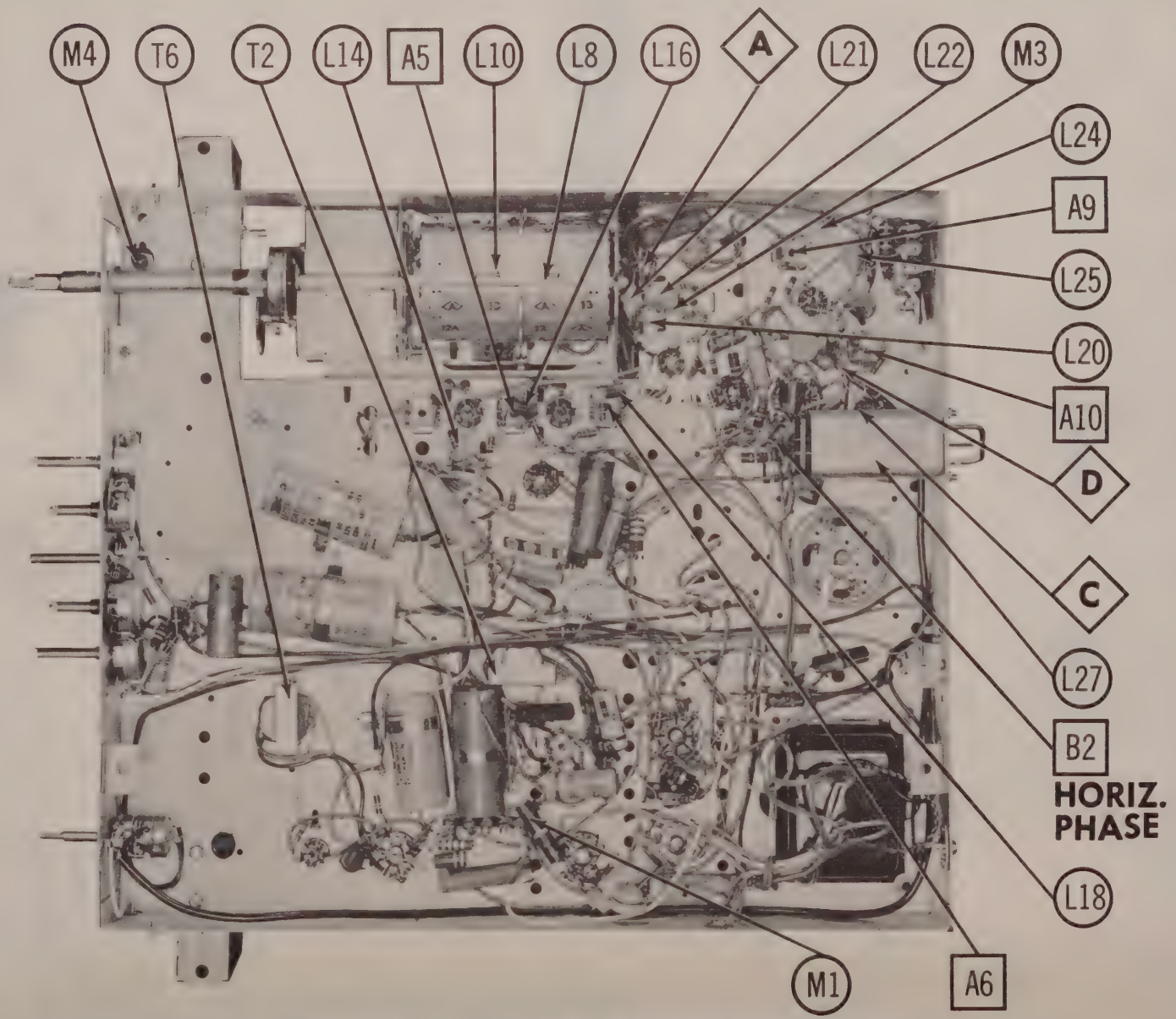
TV CHASSIS REMOVAL

1. Remove 4 push-on type control knobs and UHF dial from front panel of cabinet.
2. Remove 3 wood screws and 2 metal screws. Remove rear cover.
3. Disconnect AC line cord from radio chassis and speaker plug from rear apron of chassis.
4. Remove 4 chassis bolts. Remove chassis.
5. Remove 4 speaker nuts. Remove speaker (TV models only)

RADIO CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from front panel of the cabinet.
2. Remove 3 wood screws and 2 metal screws. Remove rear cover.
3. Disconnect speaker plug to TV chassis and speaker to radio chassis, phono plug and phono motor plug.
4. Remove 2 chassis bolts. Remove chassis.
5. Remove 8 speaker nuts. Remove 2 speakers.

OF
L. ... KENSHIP
3924 MEADE ST.
DENVER, COLORADO



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PHOTOFACT* Folder

*TRADE MARK

RAYTHEON MODELS UC-2167, UC-2168, UM-2182C, G, UM-2183A, C, G, K (Ch. 21T26AGH, 21T193AGH, 21T274AGH)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

MODEL UM-2182G

RAYTHEON MODELS UC-2167, UC-2168, UM-2182C, G, UM-2183A, C, G, K (Ch. 21T26AGH, 21T193AGH, 21T274AGH)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

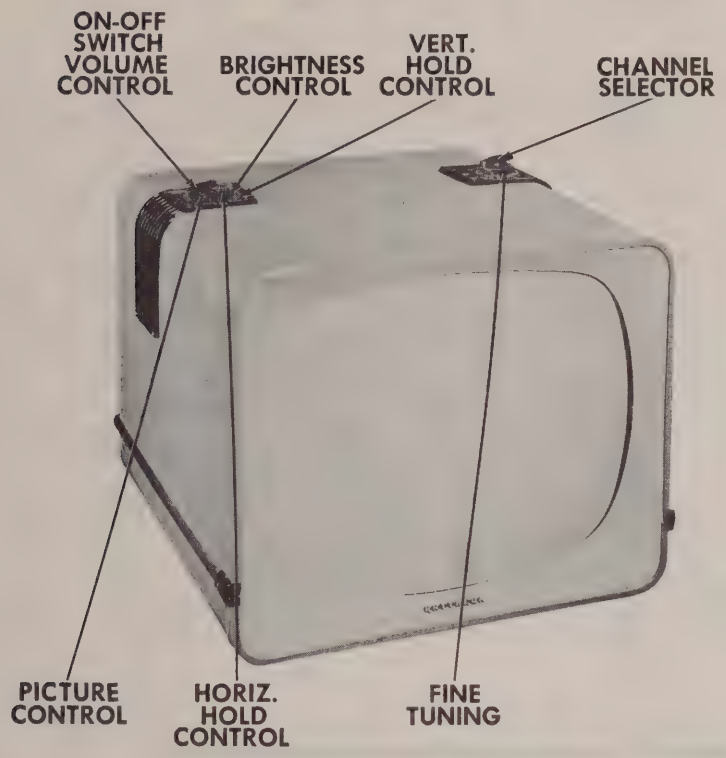
DATE 11-55 SET 297 FOLDER 7

PHOTOFACT* Folder

*TRADE MARK

RAYTHEON MODELS UC-2167, UC-2168, UM-2182C, G, UM-2183A, C, G, K (Ch. 21T26AGH, 21T193AGH, 21T274AGH)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



RAYTHEON MODEL UM-2182G

TRADE NAME	Raytheon	MODELS	CHASSIS
		UC-2167	21T26AGH
		UM-2182C, UM-2182G, UM-2183A, UM-2183C, UM-2183G, UM-2183K	21T193AGH
		UC-2168	21T274AGH
		C-2168	21T274AS
MANUFACTURER	Raytheon Manufacturing Co., Television & Radio Div., 5921 W. Dickens Ave., Chicago 39, Ill.		
TYPE SET	Television Receiver		
TUBES	Sixteen		
POWER SUPPLY	105-115 Volts AC-60 Cycle	RATING 1.47 Amp. @ 115 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 46.75MC, Sound IF 42.25MC (Intercarrier)		

INDEX

Alignment Instructions 6, 7
Drive Cord Stringing (UHF) 17
Disassembly Instructions 18
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions ..... 13 thru 16
Photographs
- Cabinet-Rear View 11
- Capacitor Identification 4, 9
- Chassis- Rear View 17
- Chassis-Top View 3
- RF Tuner 10

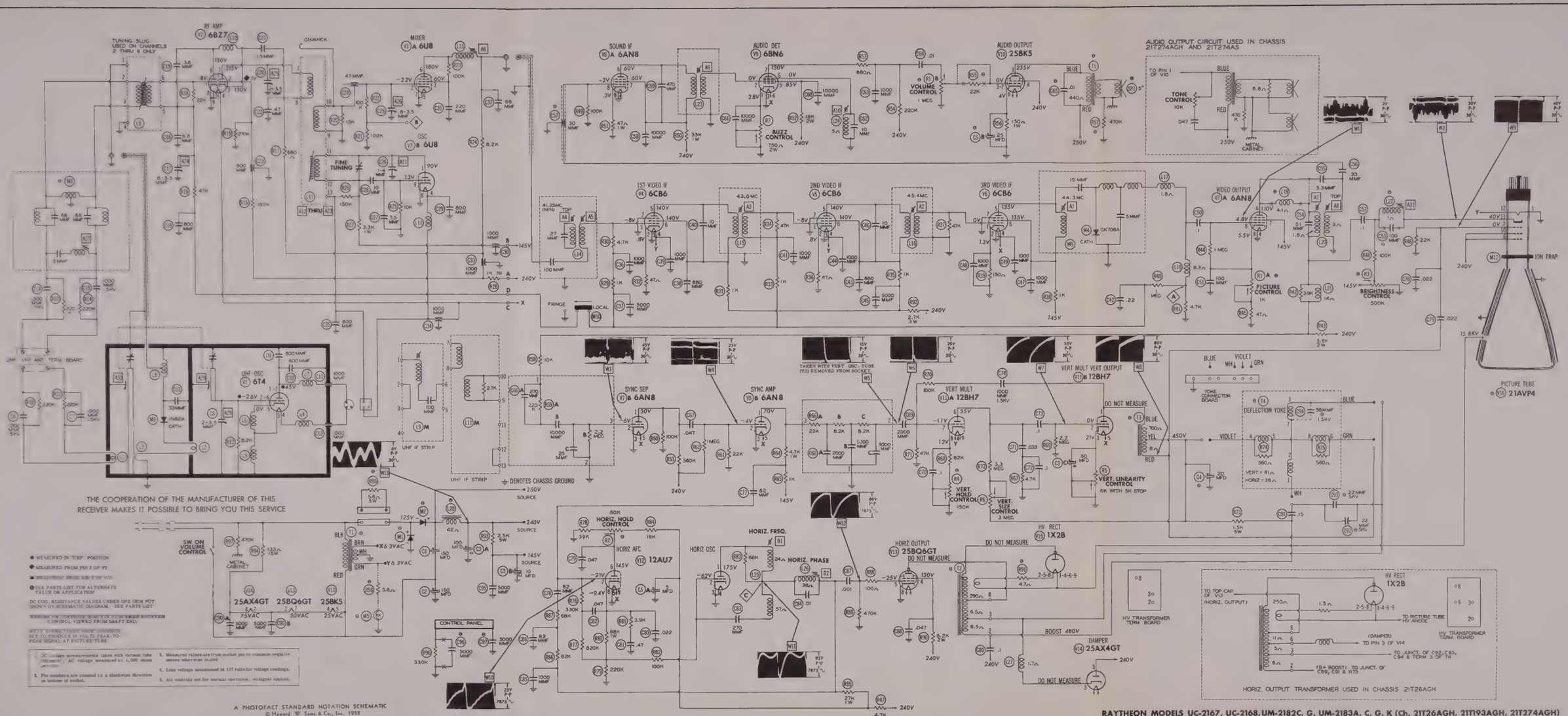
Photographs (Cont)
- Resistor Identification 19, 20
- Trans., Inductor & Alignment Identification 3

Resistance Measurements 8
Servicing in the Field 18
Schematic 2
Trouble Shooting Aids 12, 17
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

RAYTHEON MODELS UC-2167, UC-2168, UM-2182C, G, UM-2183A, C, G, K (Ch. 21T26AGH, 21T193AGH, 21T274AGH)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

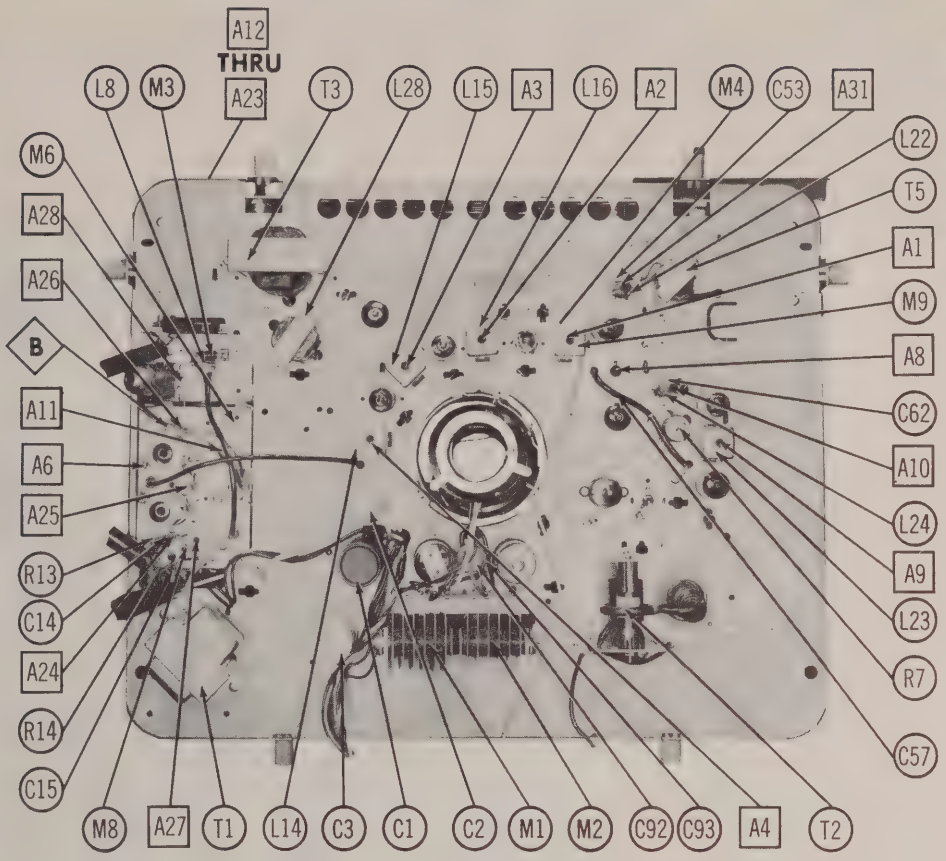

RF AMP V2 6BZ7
MIXER V3A 6U8
OSC V3B 6U8
SOUND IF V8A 6AN8
AUDIO DET V9 6BN6
AUDIO OUTPUT V10 25BK5
AUDIO OUTPUT CIRCUIT USED IN CHASSIS 21T274AGH AND 21T274AS
1ST VIDEO IF V4 6CB6
2ND VIDEO IF V5 6CB6
3RD VIDEO IF V6 6CB6
VIDEO OUTPUT V7A 6AN8
SYNC SEP V7B 6AN8
SYNC AMP V8B 6AN8
VERT MULT V11A 12BH7
VERT MULT VERT OUTPUT V11B 12BH7
HORIZ. HOLD CONTROL
HORIZ AFC V12 12AU7
HORIZ OSC
HORIZ. FREQ.
HORIZ. PHASE
HORIZ OUTPUT V13 25BQ6GT
HV RECT V15 1X2B
DAMPER V14 25AX4GT
UHF OSC V1 6T4
UHF IF STRIP
SW ON VOLUME CONTROL
CONTROL PANEL
TUNING SLUG USED ON CHANNELS 2 THRU 6 ONLY
FINE TUNING
GIMMICK
VOLUME CONTROL 1 MEG
BUZZ CONTROL 750Δ 2W
TONE CONTROL 10K
PICTURE CONTROL 1K
BRIGHTNESS CONTROL 500K
VERT. LINEARITY CONTROL 6K WITH 5K STOP
VERT. HOLD CONTROL 150K
VERT. SIZE CONTROL 3 MEG
DO NOT MEASURE
BOOST 480V
ION TRAP
PICTURE TUBE V16 21AVP4
DEFLECTION YOKE
YOKE CONNECTOR BOARD
HV TRANSFORMER TERM BOARD
HORIZ. OUTPUT TRANSFORMER USED IN CHASSIS 21T26AGH
UHF ANT. TERM BOARD
FRINGE
LOCAL
25AX4GT 25BQ6GT 25BK5
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
DENOTES CHASSIS GROUND
TAKEN WITH VERT. OSC. TUBE (V11) REMOVED FROM SOCKET.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

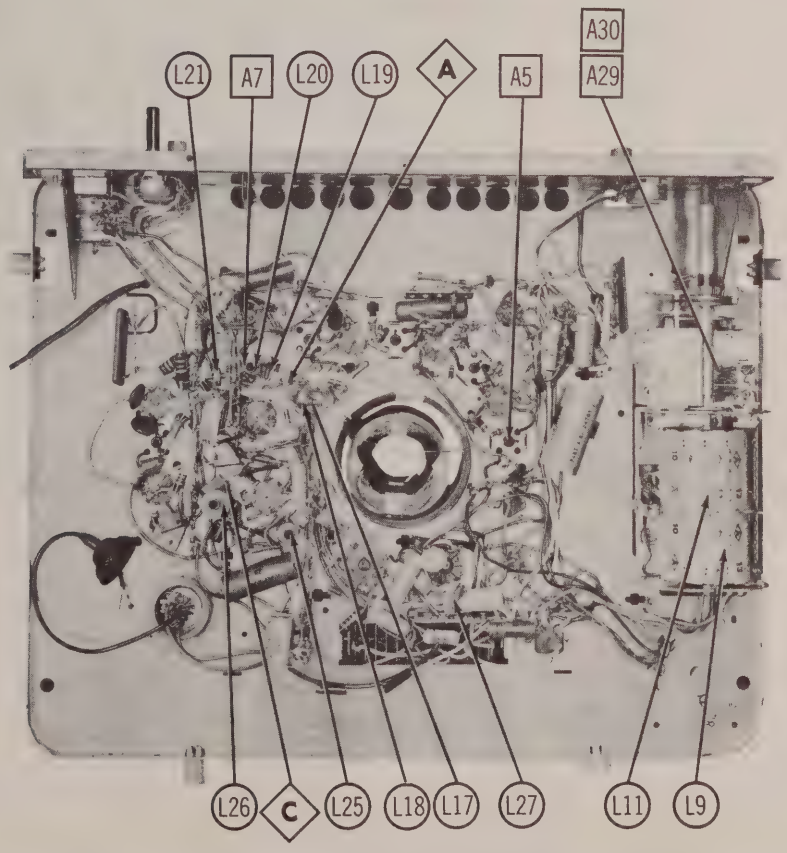
RAYTHEON MODELS UC-2167, UC-2168, UM-2182C, G, UM-2183A, C, G, K (Ch. 21T26AGH, 21T193AGH, 21T274AGH)

RAYTHEON MODELS UC-2167, UC-2168, UM-2182C, G, UM-2183A, C, G, K (Ch. 21T26AGH, 21T193AGH, 21T274AGH)

L. F. GLARKENSHIP
392 MAPLE ST.
DENVER, COLORADO

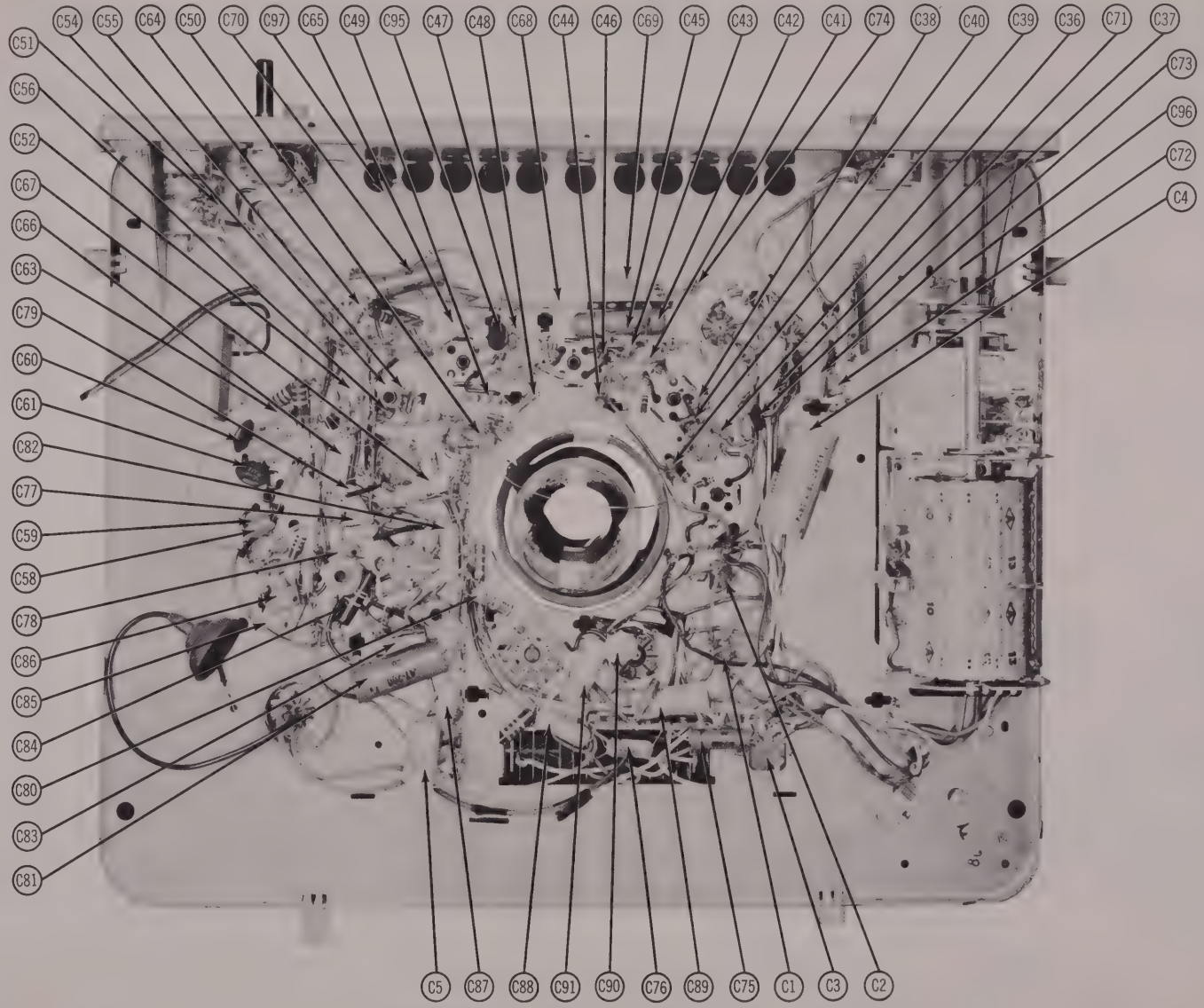


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW INDUCTOR AND ALIGNMENT IDENTIFICATION

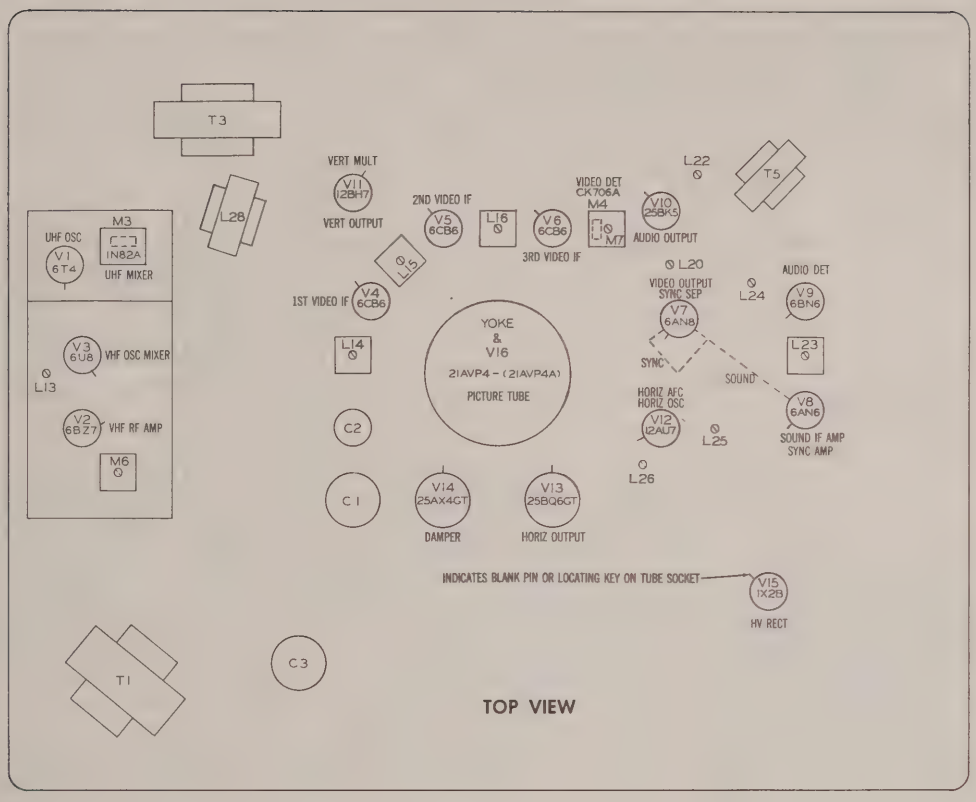
SET 297 FOLDER 7



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

DENVER, COLORADO

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

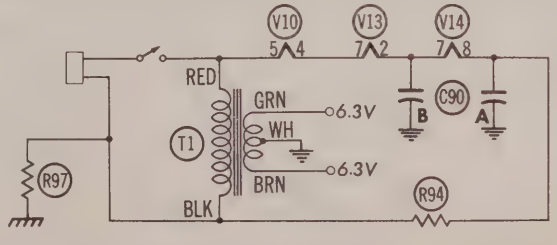
POWER SUPPLY FAILURE
No raster, no sound - Selenium Rectifiers (M1 & M2)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6, V7 (V1 UHF only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V7, V16
Has pic, no sound -V8, V9, V10

SYNC FAILURE
No vert. sync - V8, V11
No horiz. sync -V8, V12
No vert. or horiz. sync -V7, V8

SWEEP FAILURE
No raster, has sound - V12, V13, V14, V15, V16
No vertical deflection -V11
Poor vert. linearity or foldover -V11
Poor horiz. linearity or foldover - V12, V13, V14
Narrow picture -V12, V13, V14, V15, M1, M2
Vert. off freq. -V8, V11
Horiz. off freq. - V8, V12

Note: Since this receiver employs tubes used in a series-parallel filament network, an open filament in any tube in series may cause the set to be inoperative. (See circuit below).



DENVER COLORADO

RAYTHEON MODELS UC-2167, UC-2168,
UM-2182C, G, UM-2183A, C, G, K
(Ch. 21T26AGH, 21T193AGH, 21T274AGH)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
The high voltage lead should be securely taped and kept away from chassis.

VIDEO IF ALIGNMENT

Connect a .001MFD capacitor across the vertical input terminals of oscilloscope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to pin 1 (grid) of 6CB6 (V4). Low side to chassis.	Not used	44.3MC (Unmod.)	10	DC probe to point (A). Common to chassis.	A1	Attenuate signal generator output to maintain not more than 2 volts at VTVM. Adjust for maximum deflection.
2.	"	"	"	45.4MC	"	"	A2	"
3.	"	"	"	43.0MC	"	"	A3	"
4.	"	"	43.5MC (10MC Swp.)	42.5MC 45.6MC	"	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.		Use only enough sweep generator output for useable pattern on scope. Check for response curve similar to Fig. 1. If necessary retouch A1, A2 and A3 for desired response. Adjust A1 for MINIMUM tilt. A2 affects high frequency (45.6MC) side of response curve. A3 affects low frequency (42.5MC) side of curve.
5.	Direct	High side to an ungrounded tube shield floating over converter tube. Low side to chassis.	Not used	41.25MC	"	DC probe to point (A). Common to chassis.	A4	Adjust for MINIMUM deflection.
6.	"	"	43.5MC (10MC Swp.)	42.5MC 45.6MC	"	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A5, A6	Adjust A5 and A6 for response similar to Fig. 2. If necessary, slightly retouch A-1 for MINIMUM tilt, A2 for position of 45.6MC marker and A3 for position of 42.5MC marker.

SOUND IF ALIGNMENT

Restore the receiver to normal operating condition. Tune in a TV signal and adjust the fine tuning control until sound bars just appear in the picture. Adjust A7 slugfully counter clockwise from coil turns. Then clockwise until the scanning lines are smooth and continuous. Readjust the fine tuning control for clearest picture and best sound.
Insert an attenuator in series with the antenna and the receiver antenna terminals so that the signal strength may be varied from weak to strong. If a suitable attenuator is not available stray feed the signal to the receiver by placing the antenna lead in near the antenna terminals.
Reduce the signal input to the receiver so that the signal falls below the limiting level of the 6BN6 as evidenced by a hiss in the sound.
Adjust the secondary of the sound take off transformer (A8), the sound IF transformer (A9), the quadrature coil (A10) and the buzz control (R7) for maximum sound and minimum buzz. If hiss disappears while adjusting, increase attenuation until hiss reappears.

VHF OSCILLATOR ALIGNMENT

Connect the negative lead of a 1.5 Volt battery to the tuner AGC. Connect the positive lead to chassis.
Complete oscillator alignment may not be necessary. IF the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A-11. It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel. If adjustment of A-11 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustment screw for each channel that is off frequency. The channel oscillator adjustment screws are reached thru a hole just above and to the left of the channel switch shaft (hole extends through UHF tuner).
The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp.)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A12	Adjust to place sound marker in trap notch as in Fig. 3. Video marker should be at 50%.
			207MC (10MC Swp.)	205.25MC 209.75MC	12		A13	
			201MC (10MC Swp.)	199.25MC 203.75MC	11		A14	
			195MC (10MC Swp.)	193.25MC 197.75MC	10		A15	
			189MC (10MC Swp.)	187.25MC 191.75MC	9		A16	
			183MC (10MC Swp.)	181.25MC 185.75MC	8		A17	
			177MC (10MC Swp.)	175.25MC 179.75MC	7		A18	
			85MC (10MC Swp.)	83.25MC 87.75MC	6		A19	
			79MC (10MC Swp.)	77.25MC 81.75MC	5		A20	
			69MC (10MC Swp.)	67.25MC 71.75MC	4		A21	
			63MC (10MC Swp.)	61.25MC 65.75MC	3		A22	
			57MC (10MC Swp.)	55.25MC 59.75MC	2		A23	

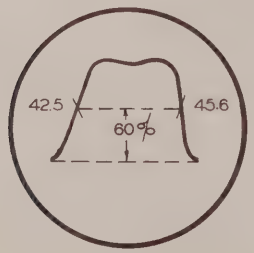


FIG. 1

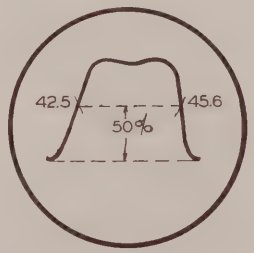


FIG. 2

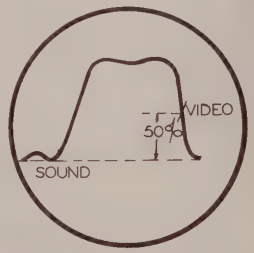


FIG. 3

ALIGNMENT INSTRUCTIONS (cont)

VHF RF AND MIXER ALIGNMENT

Connect bias as under "VHF Oscillator Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω Carbon Resistors	Across VHF antenna terminal with 120Ω in each lead.	195MC (10MC Swp.)	193. 25MC 197. 75MC	10	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A24, A25, A26,	Adjust for response curve similar to Fig. 4 with markers above 90%.
9.	"	"	213MC (10MC Swp.)	211. 25MC 215. 75MC	13	"		If markers fall below 70% on any channel, make compromise adjustment of A24, A25, and A26 with channel switch set to that channel. Then check all other channels to see that they have not been seriously affected
			207MC (10MC Swp.)	205. 25MC 209. 75MC	12			
			201MC (10MC Swp.)	199. 25MC 203. 75MC	11			
			189MC (10MC Swp.)	187. 25MC 191. 75MC	9			
			183MC (10MC Swp.)	181. 25MC 185. 75MC	8			
			177MC (10MC Swp.)	175. 25MC 179. 75MC	7			
			85MC (10MC Swp.)	83. 25MC 87. 75MC	6			
			79MC (10MC Swp.)	77. 25MC 81. 75MC	5			
			69MC (10MC Swp.)	67. 25MC 71. 75MC	4			
			63MC (10MC Swp.)	61. 25MC 65. 75MC	3			
			57MC (10MC Swp.)	55. 25MC 59. 75MC	2			

UHF TUNER ALIGNMENT

If sweep generator has no built-in marker, loosely couple UHF marker generator to sweep generator output. Use low marker generator output.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across UHF antenna terminals with 120Ω in each lead.	470MC (15MC Swp.)	45. 75MC 471. 25MC	14	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A28	Adjust A28 for maximum amplitude of response curve. Loosely couple a signal generator to an ungrounded tube shield floating over convertor tube. Set marker for 45. 75MC. Adjust the channel selector until the 45. 75MC and 471. 25MC markers coincide on response curve at the 50% point as shown in Fig. 5. If necessary, retouch A28 for correct dial calibration.
11.	"	"	870MC (15MC Swp.)	45. 75MC	80	"	A29	Loosely couple 45. 75MC marker generator to an ungrounded tube shield floating over convertor tube. Adjust A29 to place the 45. 75MC marker at 50% on response curve as in Fig. 5.
12.	"	"	"	"	"	"	A30	Adjust for maximum amplitude of response curve.

IF WAVE TRAP ADJUSTMENT

The IF wave trap should be tuned to minimize interference caused by signals which fall within the video IF bandpass (40-48MC). Tune in a station on which the interference is noted and adjust A27 for minimum interference in the picture.

4. 5MC TRAP ADJUSTMENT

Tune in a TV station and adjust A31 for minimum 4. 5MC beat interference in picture.

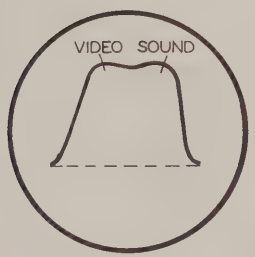


FIG.4

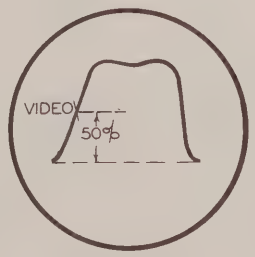


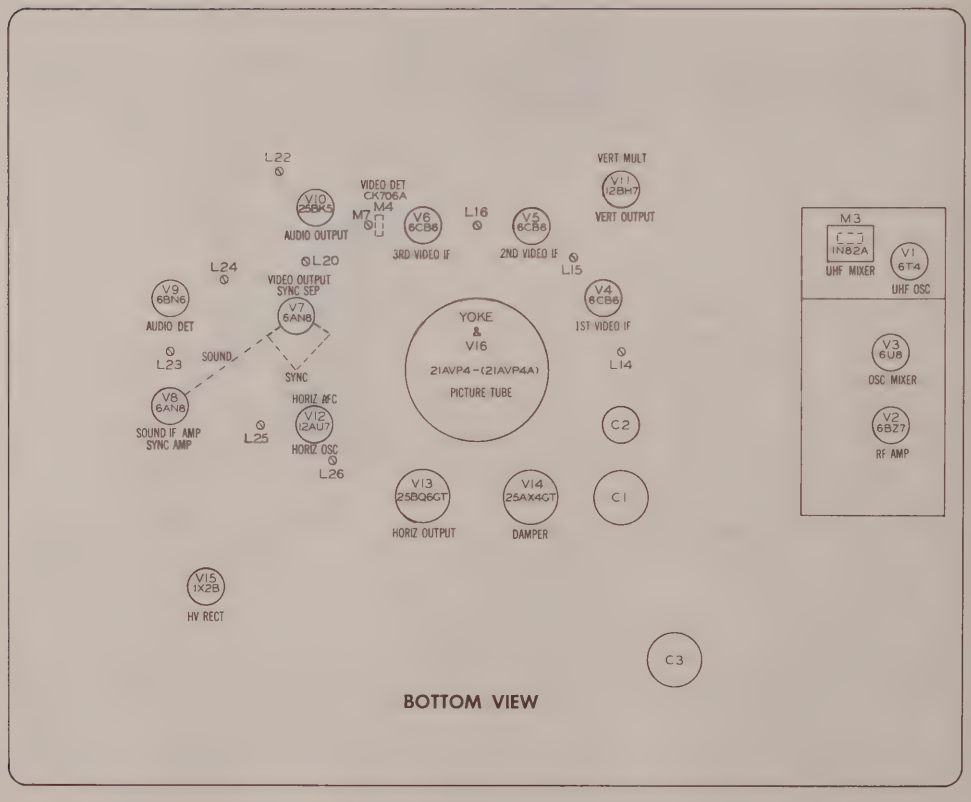
FIG. 5

RAYTHEON MODELS UC-2167, UC-2168, UM-2182C, G, UM-2183A, C, G, K (Ch. 21T26AGH, 21T193AGH, 21T274AGH)

RESISTANCE MEASUREMENTS

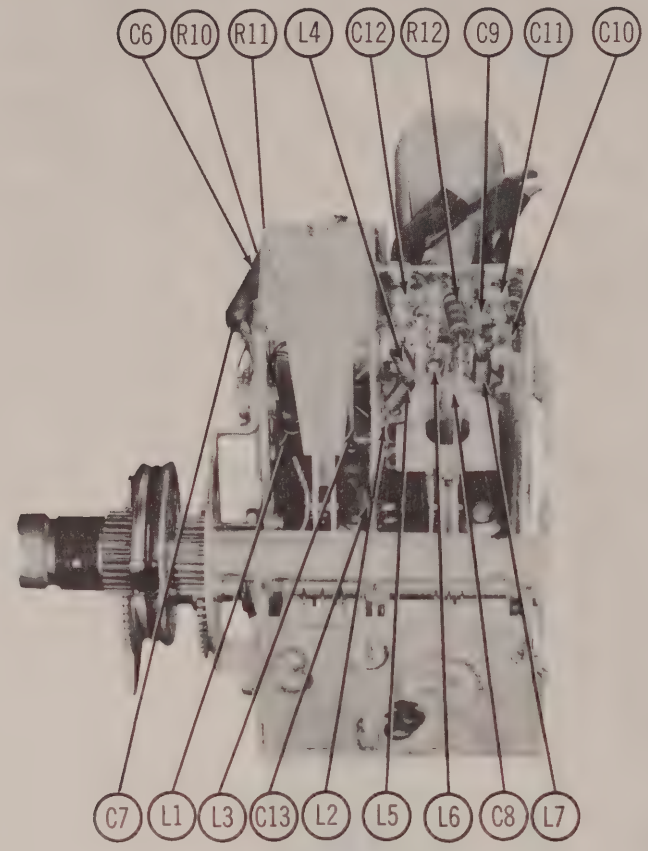
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6T4	*†5. 8KΩ	8. 2KΩ	0Ω	. 1Ω	0Ω	8. 2KΩ	*†5. 8KΩ		
V 2	6BZ7	†1. 7KΩ	120KΩ	INF.	. 1Ω	0Ω	INF.	1Meg	0Ω	0Ω
V 3	6U8	†5. 8KΩ	200KΩ	†100KΩ	. 1Ω	0Ω	†9. 2KΩ	0Ω	0Ω	10KΩ
V 4	6CB6	1Meg	47Ω	0Ω	. 1Ω	†3. 7KΩ	†3. 7KΩ	0Ω		
V 5	6CB6	1Meg	47Ω	0Ω	. 1Ω	†3. 7KΩ	†3. 7KΩ	0Ω		
V 6	6CB6	. 1Ω	150Ω	0Ω	. 1Ω	†3. 5KΩ	†3. 5KΩ	0Ω		
V 7	6AN8	†130KΩ	2. 2Meg	0Ω	0Ω	. 1Ω	†5. 6KΩ	†2. 5KΩ	1Meg	250Ω
V 8	6AN8	†8. 2KΩ	22KΩ	0Ω	0Ω	. 1Ω	†33KΩ	†33KΩ	100KΩ	47Ω
V 9	6BN6	350Ω	. 2Ω	0Ω	. 1Ω	†18KΩ	5Ω	†220KΩ		
V 10	25BK5	†440Ω	TP	250KΩ	♦11Ω	♦0Ω	150Ω	250KΩ	42Ω	TP
V 11	12BH7	▲2. 2KΩ	2. 2Meg	1. 7KΩ	. 1Ω	. 1Ω	▲5Meg	47KΩ	120KΩ	2. 5Ω
V 12	12AU7	†32KΩ	320KΩ	0Ω	0Ω	0Ω	†27KΩ	1. 5Meg	300KΩ	. 1Ω
V 13	25BQ6GT	NC	♦21Ω	TP	†8. 2KΩ	470KΩ	NC	♦11Ω	0Ω	TOP CAP ▲8. 2Ω
V 14	25AX4GT	TP	NC	250KΩ	NC	†42Ω	NC	♦21Ω	♦28Ω	
V 15	1X2B		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲300Ω
V 16	21AVP4	0Ω	22KΩ	PIN 6 †42Ω	PIN 10 †42Ω	PIN 11 †200KΩ	PIN 12 . 1Ω			

♦MEASURED FROM PIN 5 OF V10.
*MEASURED IN "UHF" POSITION.
†MEASURED FROM OUTPUT OF M2.
▲MEASURED FROM PIN 3 OF V14.
TP-TIE POINT.
NC- NO CONNECTION

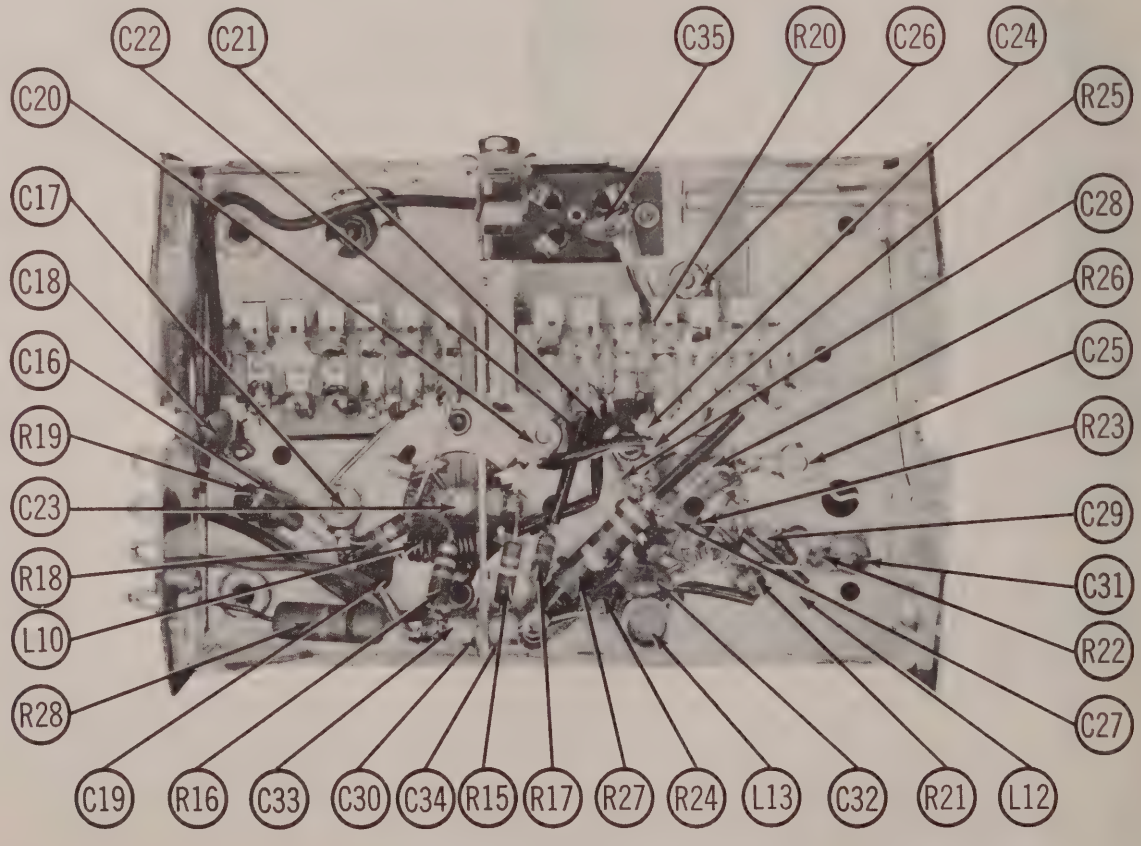


BOTTOM VIEW

TUBE PLACEMENT CHART

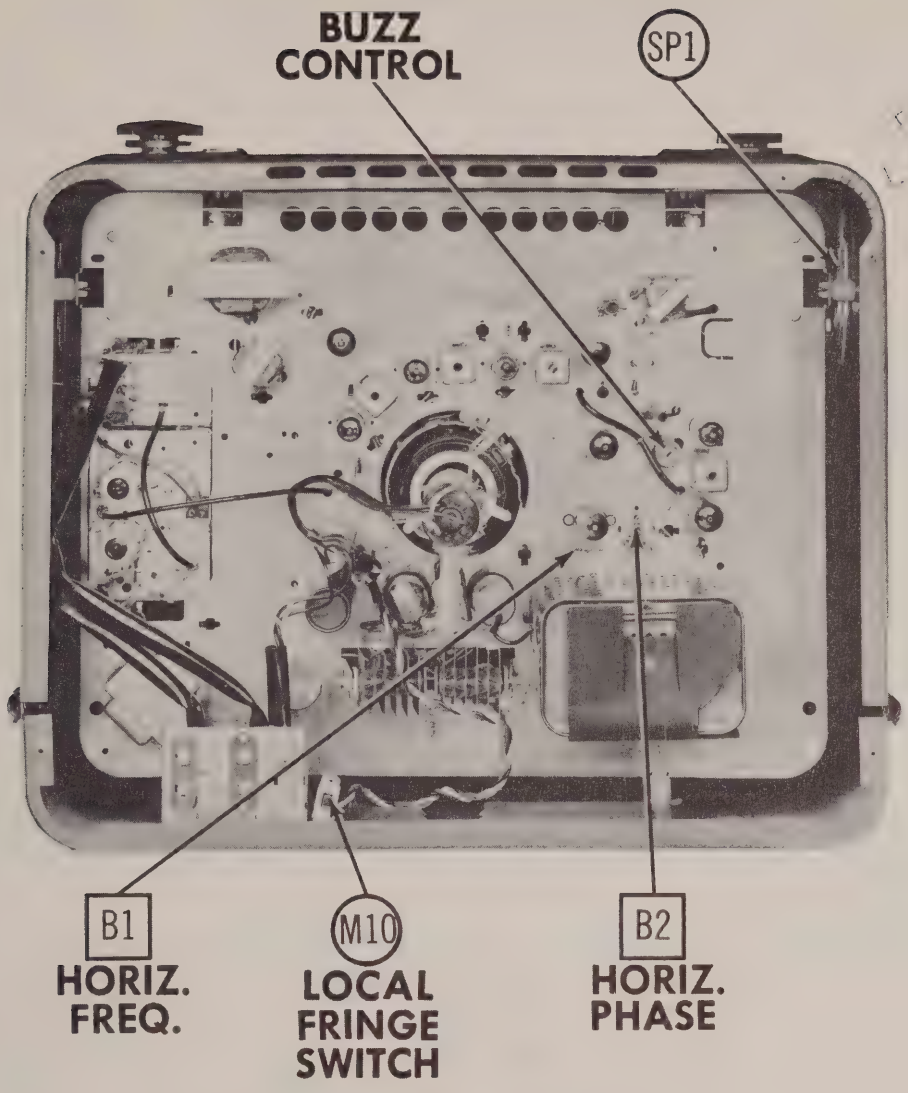


UHF TUNER-RIGHT SIDE



VHF TUNER-BOTTOM VIEW

PROPERTY OF
L. F. [illegible]SHIP
3924 MEADE ST.
DENVER, COLORADO



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Turn the horizontal hold control (R2) to its mid-range position.

Connect a short clip lead across L26. Adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally. Remove clip lead from L26. Connect the vertical amplifier of the oscilloscope thru a low capacity probe to point Ⓒ. Low side to chassis. Adjust the horizontal phase slug (B2) until waveform similar to Fig. 6 is obtained. While making this adjustment keep the picture in sync with the horizontal hold. Remove scope connection. Check range of horizontal hold control (R2). Turn R2 fully counter clockwise then back fully clockwise. The picture should fall out of sync at each extreme setting of R2.

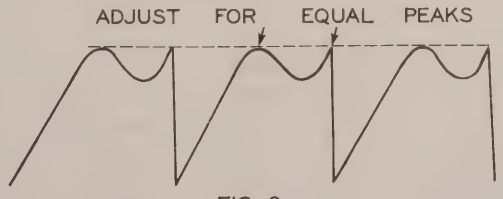


FIG. 6

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V13 and V14. Check M1 and M2. Check R90, R94, R95, T2, T4A, C87, C85 and other associated components.

DRIVE LINES

Check by substitution V13 and V14. Check T2, T4A, R90, R95, C85, C87 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V13 and V14. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V12, V13, and V14. Check C80 and C81 for open. Check L25, C82, R78, R2 and other associated components.

XMAS TREE EFFECT

Check by substitution V12, V13, V14. Check T2 and T4 for internal arcing. Check L25, L26, C86, C81, C83, C84, R82, R83 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V11. Check waveform W7.

If Satisfactory	If Unsatisfactory
Check T3, T4B, R5, C3C and other associated components.	Check C69, C73, C70, R68, R73, R72 and other associated components.

INSUFFICIENT SWEEP

Substitute V11. Check vertical size and vertical linearity controls for proper operation. Check R72, T3 and other associated components.

COMPRESSED AT BOTTOM

Substitute V11. Check R72, R73, C69, C73 and other associated components.

COMPRESSED AT TOP

Substitute V11. Check R5, C3C, T3, T4B and other associated components.

FOLDS

Substitute V11. Check C71, C72, C73, R72, R67, R73, T3, T4B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V7 and V8. Check C66, C67, R63, R64, R65 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V11. Check vertical integrator network. Check C69, C70, R68, R4 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Substitute V12. Check C77, C82, C81, C80, R82, L25, L26, and other associated components.

HORIZONTAL BENDING

Check by substitution V7, V8 and V12. Check components associated with V12.

VIDEO

LOSS OF VIDEO

Substitute V7. Check C50, C52, R43, R45 and other associated components.

SOUND BARS(4.5 BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A8 and A31. Check video IF alignment.

POOR CONTRAST

Substitute V7. Check C50, C52, R45, R43, L21 and other associated components.

NEGATIVE PICTURE

Substitute V7. Check picture tube. Check C50, C52, R43, R42 and other associated components.

SMEAR

Substitute V7. Check L17, L18, L21, C50, C52 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V2, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9, and V10. Check stage V10 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check audio detector and audio IF stages for component failure or change of value.	Check C64, C65, R53, R54, T5 speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustments A10 and R7 for minimum buzz. If still unsatisfactory, check audio IF Alignment.

DISTORTED

Follow procedure outlined under "Weak or no Sound".

POWER

DEAD SET

If filaments fail to light, except V10, V13 and V14, check T1. If V10, V13 and V14 fail to light, check filament continuity and R94, since these tubes are connected in series. Check AC interlock assembly and switch on volume control. If filaments light, check M1, M2, and R95. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Check M1, M2 and R95. Check B+ filter and decoupling network.

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		RAYTHEON PART No.	STANDARD REPLACEMENT		
V1	UHF Osc.	6T4	6T4	7DK	
V2	RF Amp.	6BZ7	6BZ7	9AJ	
V3	Mixer-Osc.	6U8	6U8	9AE	
V4	1st. Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Output-Sync Separator	6AN8	6AN8	9DA	
V8	Sound IF Amp.-Sync Amp.	6AN8	6AN8	9DA	
V9	Audio Detector	6BN6	6BN6	7DF	
V10	Audio Output	25BK5	25BK5	9BQ	
V11	Vert. Mult.-Vert. Output	12BH7	12BH7	9A	
V12	Horiz. AFC-Horiz. Osc.	12AU7	12AU7	9A	
V13	Horiz. Output	25BQ6GT	25BQ6GT	6AM	
V14	Damper	25AX4GT	25AX4GT	4CG	
V15	HV Rectifier	1X2B	1X2B	9Y	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	RAYTHEON PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V16	21AVP4			21AVP4	21AVP4	12L	① Aluminized
		21AVP4A ①		21AVP4A ②	21AVP4A ①	12L	② Silver Screen
	21YP4	21YP4	21YP4	21YP4	21YP4	12L	
	21YP4A ①	21YP4A ①	21YP4A ①	21YP4A ②	21YP4A ①	12L	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	RAYTHEON PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1	150	150	8C-22464	FP117	TM-150-150	T-050	
C2	150	150	8C-22463	FP117	TM-150-150	T-050	
C3A	▲100	300	8C-22523	FP326.6	TM-3137		
B	■10	300					
C	▲60	50					
C4	20	500		TC83	TD-20-500	S-315	Note 1
C5A	5	300	8C-24193	TC60	TD-8-350	FM-3508	
B	25	25					Note 2

Note 1. Some versions use 550V unit in this application (part #8C-25094). Chassis 21T26AGH combine C4 with C3 (part #8C-23689).
Note 2. C5B used only in chassis 21T274AGH and 21T274AS (single unit C5A part #8C-24174).

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	RAYTHEON PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C6	1000	1500	8G-22656	DD30-102	1R5KV-102	MCK210	
C7	1000	1500	8G-22656	DD30-102	1R5KV-102	MCK210	
C8	2-5.5			829-6			
C9	800		103G-24769	DD-801	831-801	DC-521	
C10	800		103G-24769	DD-801	831-801	DC-521	
C11	1000		103G-24756				
C12	1000		103G-24756				
C13	33		103G-24770	TCN-33	N750K-330		
C14	1000	1500	8G-22656	DD30-102	1R5KV-102	MCK210	
C15	1000	1500	8G-22656	DD30-102	1R5KV-102	MCK210	
C16	6.8		103G-24754	TCZ-6R8	NP0A-6R8	ZT-5568	
C17	.8-3.5		103G-24753				
C18	800		103G-24755	DD-801	831-801	DC-521	
C19	3.6		103G-24758				
C20	.8-3.5		103G-24760				
C21	1.5		103G-24759	TCZ-1R5	NP0A-1R5	ZT-5515	
C22	47		103G-24761	DD-470	831-470	UC-5447	
C23	800		103G-24757				
C24	47		103G-24762	MFT-50			
C25	.8-3.5		103G-24764				
C26	1-4		103G-24767	829-4	3115-01-10	CT551	
C27	7.5		103G-24765				
C28	10		103G-24766				
C29	800		103G-24755	DD-801	831-801	DC-521	
C30	1000		103G-24756				
C31	220		103G-24763	DD-221	811-221	UC-5322	
C32	68		103G-24768	TCN-68	N750L-680		
C33	1000		103G-24756				
C34	1000		103G-24756				
C35	800		103G-24755	DD-801	831-801	DC-521	
C36	1000		8G-13201	D6-102	GP2L-102	UC-521	
C37	5000		8G-13962	DD-502	811-005	DC-525	
C38	680		8G-21105	D6-681	GP2K-681	UC-5368	
C39	1000		8G-13201	D6-102	GP2L-102	UC-521	
C40	10		8G-19502	TCN-10	N750K-100	NT-541	
C41	1000		8G-13201	D6-102	GP2L-102	UC-521	
C42	.22	200	8K-23086			PT4022	
C43	680		8G-21105	D6-681	GP2K-681	UC-5368	
C44	1000		8G-13201	D6-102	GP2L-102	UC-521	
C45	5000		8G-13962	DD-502	811-005	DC-525	
C46	10		8G-19502	TCN-10	N750K-100	NT-541	
C47	1000		8G-20754	D6-102	GP2L-102	UC-521	
C48	1000		8G-20754	D6-102	GP2L-102	UC-521	
C49	1000		8G-13201	DD-102	801-001	DC-521	
C50	.1	200	8K-23084	DF-104		PT401	
C51	100		8G-11734	D6-101	GP1K-101	UC-531	
C52	.1	400	8K-23095	DF-104		PT401	
C53	100	500		D6-101	801-101	MCB235	Note 4
C54	51		8G-23793				

DENVER, COLORADO

CAPACITORS (cont)

ITEM No	RATING CAP	RATING VOLT	REPLACEMENT DATA RAYTHEON PART No	CENTRALAB PART No	ERIE PART No	MALLORY PART No	NOTES
C55	3.3		81-23551	TCZ-3R3	NP0A-3R3	ZT-5533	
C56	33		8G-19503	TCZ-33	NP0L-330	ZT-5433	
C57	30		16B-23772				Note 3
C58	10000		8G-20369	DD-103	81-01	DC-511	
C59	470	500	8F2-121	D8-471	81-471	MCB245	
C60	10000		8G-20369	DD-103	81-01	DC-511	
C61	10000		8G-20369	DD-103	81-01	DC-511	
C62	10		8G-11789	TCZ-10	NP0K-100	ZT-541	
C63	1000		8G-13201	DD-102	GP2L-102	UC-521	
C64	.01	400	8K-23081	D8-103	GP2-333-103	PT411	
C65	.01	600	8K-23103	D8-103	GP2-333-103	PT411	Note 7
C66A	270				GP3K-271	UC-5327	
B	10000		†17A-24212	†PC-263	81-01	DC-511	
C	25				GP1K-250	UC-5425	
C67	.047	200	8K-23083	DF-503		PT1497	
C68A	2000					DC-522	
B	5000		∗17A-22376	∗PC-100	∗1405-01	DC-525	
C	5000					DC-525	
C69	2000		8G-19522	D8-202	GP2-333-202	UC-522	
C70	.1	200	8K-23084	DF-104		PT401	
C71	.033	400	8K-23816				
C72	.1	200	8K-23084	DF-104		PT401	
C73	.1	400	8K-23095	DF-104		PT401	
C74	1000	1500	8G-24991	DD30-102	1R5KV-102	MCK210	
C75	.022	600	8K-23104	DF-203	81-7-02	PT6122	
C76	.022	200	8K-23082	DF-203	81-7-02	PT6122	
C77	82	500	8F3-113	D8-820	801-820		
C78	82	500	8F3-112	D8-820	801-820		
C79	.047	400	8K-23094	DF-503		PT1497	
C80	.022	200	8K-23083	DF-303	81-7-02	PT4122	
C81	.47	200	8K-23087			PT2407	
C82	.047	200	8K-23083	DF-503		PT1497	
C83	250	500	8F5-235	TCZ-270	NP0-335-271	MCE241	
C84	.01	600	8M-24439				
C85	1000	500	8F7-125			MCB255	
C86	82	500	8F3-113	D8-820	801-820		
C87	.001	500	8K-23099	D8-102	GP2L-102	PT621	
C88	.047	400	8K-23094	DF-503		PT1497	
C89	.1	600	8K-23106	DF-104		PT601	
C90A	5000		8G-23790	DD2-502	81-005	DC-525	
B	5000			DD2-502	81-005	DC-525	
C91	.15	200	8K-23085			PT4015	
C92	22	5000		DD60-220	6KV-220	DC60422	Note 8
C93	22	5000		DD60-220	6KV-220	DC60422	Note 9
C94	56	1500	8G-24709	DD30-680	1R5KV-680	DC30468	Note 10
C95	5000		8G-13982	DD-502	81-005	DC-525	
C96	5000			DD-502	81-005	DC-525	Note 5
C97	5000			DD-502	81-005	DC-525	Note 6

Note 3. C57 is a shielded lead with 30MMF capacity.
Note 4. Not used in some versions.
Note 5. Not used in chassis 21T26AGH.
Note 6. Chassis 21T274AGH and 21T274AS use .01MFD in this application (part #8K-23102).
Note 7. Chassis 21T274AGH and 21T274AS use .047MFD in this application (part #8K-23105).
Note 8. Chassis 21T26AGH use 220MMF in this application (part #6G-23953).
Note 9. Chassis 21T26AGH use 47MMF in this application (part #6G-24026).
Note 10. Chassis 21T274AS and some 21T193AGH chassis use 68MMF in this application (part #8G-24709).
Chassis 21T26AGH use 47MMF in this application (part #6G-23645).
† Items C68A, C68B, C68C, R68A, R66B and R66C are combined in one unit.
∗ Items C68A, C68B, C68C, R66A, R66B and R66C are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA RAYTHEON PART No	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1000Ω	½	10A-24698	QJ-794∗∗	RTV-527	F1-5	UF13R	Picture (Panel)
B	1Meg	½				R2-52	UR16A	Volume (Rear) Attach to R1A.
C	Switch					KB-1	US-26	Attach to R1B.
R1A	1000Ω	½	10A-23714	QJ-734 †	RTV-486	F1-4	UF15L	Picture (Panel) See Note #2.
B	1Meg	½				R2-52	UR16A	Volume Attach to R1A (Rear).
C	Switch					KB-1	US-26	Attach to R1B.
R2A	50KΩ	½	10B-23694	QU1-123	A47-50K-S	AB-31	TA54L	Horizontal Hold
B	Shaft	½	Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A.
R2	50KΩ	½	10B-24260	QU1-123		B-31		Horizontal Hold See Note #3.
R3A	500KΩ	½	10B-23695	QU1-133	A47-500K-S	AB-59	TA55L	Brightness
B	Shaft	½	Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R3A.
R3A	500KΩ	½	10A-24259	QU1-133	A47-500K-S	B-59	U-50	Brightness See Note #2.
B	Shaft	½	Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A.
R4A	150KΩ	½	10B-23693-1	QU1-128	A47-150K-S	AB-43	TA184L	Vertical Hold
B	Shaft	½	Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R4A.
R4A	150KΩ	½	10B-24258-1	QU1-129		AB-43		Vertical Hold See Note #3.
B	Shaft	½	Not Req.	Not Req.		AK-4		Attach to R4A.
R5A	6000Ω	½	10B-23407	QU1-114▲	A47-5000-S▲	AB-10▲	TA53L▲	Vertical Linearity (Stop at 5000Ω).
B	Shaft	½	Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R5A.
R6A	1Meg	½	10B-23696	QU1-140	A47-1Meg-S	AB-64	TA-38L	Vertical Size
B	Shaft	½	Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R6A.
R7	750Ω	2	10D-23857		39-750			Buzz (Wire Wound)
R8	10KΩ	½	10B-24261	QU1-116		B-59		Tone See Note #1.
R9A	150KΩ	½	10B-24242-1			F1-32		Vertical Hold See Note #1.
B	50KΩ					R2-39		Horizontal Hold

Note 1. Used in chassis 21T274AGH and 21T274AS.
Note 2. Used in chassis 21T26AGH and 21T274AGH only.
Note 3. Used in chassis 21T26AGH only.
∗ Universal Replacement (Mallory Exact Duplicate Part No. UE66).
▲ Universal Replacement (Mallory Exact Duplicate Part No. UE65).
† CONCENTRIKIT EQUIVALENT; K-6 KIT, BASE ELEMENTS AND SHAFTS; B17-108, P17-102 (Panel) B13-137, R2-115 (Rear) 76-1 Switch
▲ Connect a 1000Ω resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. Control viewed from shaft end, terminals down.
∗∗ CONCENTRIKIT EQUIVALENT; K-5 KIT, BASE ELEMENTS AND SHAFTS; B17-108, P1-020 (Panel) B13-137, R3-103 (Rear) 76-1 Switch

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA RAYTHEON PART No	IRC PART No.	NOTES
R10	220KΩ	½	9B1-27	BTS-220K	
R11	220KΩ	½	9B1-27	BTS-220K	
R12	820Ω	½			
R13	220KΩ	½	9B1-27	BTS-220K	
R14	220KΩ	½	9B1-27	BTS-220K	
R15	270KΩ	½			
R16	180KΩ	½			
R17	680Ω	½	9B1-80	BTS-680	
R18	22KΩ	½	9B1-78		
R19	47KΩ	½	9B1-83		
R20	15KΩ	½			
R21	100KΩ	½	9B1-86		
R22	100KΩ	½	9B1-86		
R23	100KΩ	½	9B1-86		
R24	8200Ω	½			
R25	10KΩ	½	9B1-74		
R26	150KΩ	½			
R27	3300Ω	1			
R28	1000Ω	1	9B2-62	BTA-1000	
R29	1000Ω	½	9B1-62	BTS-1000	
R30	4700Ω	½	9B1-70		
R31	1000Ω	½	9B1-62	BTS-1000	
R32	47Ω	½	9B1-46	BTS-47	
R33	1000Ω	½	9B1-62	BTS-1000	
R34	47KΩ	½	9B1-82		
R35	1000Ω	½	9B1-62	BTS-1000	
R36	47Ω	½	9B1-46	BTS-47	
R37	47KΩ	½	9B1-82		
R38	1000Ω	½	9B1-62		
R39	150Ω	½	9B1-52	BTS-150	
R40	1Meg	½	9B1-98	BTS-1Meg	
R41	4700Ω	½	9B1-70		
R42	3900Ω	½	9B1-69		
R43	5600Ω	2	9B4-71	BTB-5600	
R44	1Meg	½	9B1-98		
R45	47Ω	½	9B1-46	BTS-47	
R46	22KΩ	½	9B1-78		
R47	4700Ω	½	9B1-17	BTS-4700	
R48	100KΩ	½	9B1-86	BTS-100K	
R49	100KΩ	½	9B1-86	BTS-100K	
R50	33KΩ	1	9B2-80	BTA-33K	
R51	47Ω	½	9B1-46	BTS-47	
R52	18KΩ	2	9B4-77	BTB-18K	
R53	680Ω	½	9B1-60	BTS-680	
R54	220KΩ	½	9B1-90	BTS-220K	
R55	22KΩ	½	9B1-78	BTS-22K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA RAYTHEON PART No	IRC PART No.	NOTES
R56	150Ω	½	9B2-52	BTA-150	
R57	470KΩ	½	9B1-29	BTS-470K	Note 1
R58	10KΩ	½	9B1-74	BTS-10K	
R59A	320KΩ	½	†17A-24212		
B	2.2Meg	½			
R60	100KΩ	½	9B1-86		
R61	22KΩ	½	9B1-78		
R62	1Meg	½	9B1-98		
R63	560KΩ	½	9B1-96		
R64	4700Ω	1	9B2-70		
R65	1000Ω	½	9B1-62		
R66A	32KΩ	½			
B	8200Ω	½	∗17A-22376		
C	8200Ω	½			
R67	4700Ω	½	9B1-70		
R68	82KΩ	½	9B1-88		
R69	2.2Meg	½	9B1-102		
R70	100KΩ	½	9B1-86		
R71	47KΩ	½	9B1-82		
R72	3.3Meg	½	9B1-104	BTS-3.3Meg	
R73	1500Ω	5	9C12-1101	1 3/4A-1500	
R74	560Ω	½	9B1-59		
R75	560Ω	½	9B1-59		
R76	330KΩ	½	9B1-92		
R77	820KΩ	½	9B1-97		
R78	39KΩ	½	9B1-81		
R79	220KΩ	½	9B1-90		
R80	68KΩ	1	9B1-84		
R81	3900Ω	½	9B1-69		
R82	100KΩ	½	9B1-86		
R83	68KΩ	½	9B1-84		
R84	18KΩ	½	9B1-77		
R85	27KΩ	½	9B2-79		
R86	82KΩ	½	9B1-85		
R87	68KΩ	½	9B1-84		
R88	100Ω	½	9B1-50		
R89	470KΩ	½	9B1-94		
R90	8200Ω	2	9B4-73		
R91	4.7Ω 5%	½	9C1-1071		
R92	2700Ω	3	9C11-1104		Note 2
R93	2500Ω	5	9C-24033	PW7-2500	
R94	133Ω	15	9C-23872		
R95	5.6Ω	5	∗6M-23018		
R96	330KΩ	½	9B1-92	BTS-330K	Note 3
R97	470KΩ	½	9B1-94	BTS-470K	
R98	5.6Ω	½	9C1-1072	BTS-5.6	Note 4

Note L Not used in some versions.
Note 2. A 1.5Ω ½W 5% resistor is used in chassis 21T26AGH.
Note 3. A 9Ω 5W fuse resistor is used in chassis 21T26AGH.
Note 4. Used in 21T26AGH, 21T274AGH chassis only.
† Items C68A, C68B, C68C, R59A, R59B are combined in one unit.
∗ Items C68A, C68B, C68C. R66A, R66B, R66C are combined in one unit.

TRANSFORMER (FILAMENT)

ITEM No.	RATING PRI.	RATING SEC 1	RATING SEC 2	REPLACEMENT DATA RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordorson PART No.	Triad PART No.
T1	117VAC	12VCT		12D-23699-3	F5526 ①	P-2959 ①		P-8130	21F67	
	④.30A	④2.1A		12D-23699 ②						

① Drill new mounting holes.
④ Used in chassis 21T26AGH and 21T274AGH and 21T274AS.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA RAYTHEON PART No	Halldorson PART No	Merit PART No.	RCA TYPE No.	Ram PART No	Stancor PART No	Thordorson PART No	Triad PART No
T2	Horiz. Output Trans.	12E-24612 ①							
		12E-23939 ⑦				X12S ∗		FLY-80 ∗	
T3	Vert. Output Trans.	12E-19048-①④	Z1804 ③	A-3037 ③	222T1 ③	V313 ③	A-8123 ③	26852 ③	A-102X ③
		12E-23726-④①	Z1804 ①	A-3037 ①	222T1 ①	V313 ①	A-8123 ①	26852 ①	A-102X ①
		12E-23726 ②	Z1804 ②	A-3037 ②	222T1 ②	V313 ②	A-8123 ②	26852 ②	A-102X ②
T4A	Yoke-Horiz. (24.5MH)	201-24632-2④	DF604 ⑥⑦	MDF-75 ⑥⑦		Y70F25 ⑥⑦	DY-15A ⑥⑦	Y-12 ⑥⑦	Y-19-1 ⑥⑦
B	Vert. (41.5MH)	201-24632-1 ①⑤	DF604 ⑥⑦	MDF-75 ⑥⑦	222T1 ⑤	Y70F25 ⑥⑦	DY-15A ⑥⑦	Y-12 ⑥⑦	Y-19-1 ⑥⑦
		201-24563-1 ②④							
		16M-24498-①⑤							
		16M-23770-②④							

① Used in all chassis except 21T26AGH.
② Used in chassis 21T26AGH only.
③ Drill new mounting hole(s).
④ Includes capacitor C94, resistors R74 and R75.
⑤ Yoke rear cover and centering device.
⑥ Use original rear cover and centering device.
⑦ Use original horizontal yoke damping network.

(PART No. 12E-23939 ONLY)

∗HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordorson Replacement Connections	Triad Replacement Connections
8				8	8		
6				6	6		
3				3	3		
2				2	2		

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA RAYTHEON PART No	Halldorson PART No	Merit PART No	Stancor PART No	Thordorson PART No	Triad PART No	NOTES
T5	6.4KΩ	3.7Ω	12C-23704-1	Z1113 ①	A-3026	A-3878 ①	22847 ① ③	8-7X ①	① Drill one new mounting hole. ② Used in chassis 21T274AGH, 21T274AS ③ Tape primary center tap
			12C-24170 ②						

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP	REPLACEMENT DATA RAYTHEON PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	6"	PM	3.7Ω	18A-24682 ①	5A07	① Used in chassis 21T193AGH
	8"	PM	3.7Ω	18A-21433 ②	6A1	② Used in chassis 21T26AGH
	4"	PM	3.7Ω	18A-24163 ③	4A07	③ Used in chassis 21T274AGH, 21T274AS
	10"	PM	3.7Ω	18A-21442 ③	10A31	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC	REPLACEMENT DATA RAYTHEON PART No.	MEISSNER PART No.	MERIT PART No	MILLER PART No.	NOTES
L1	UHF Ant. Coil	0Ω						
L2	UHF Osc. Coupling Coil	0Ω						
L3	UHF Osc. Coil	0Ω						
L4	Fil. Choke	0Ω		83-64245				
L5	Fil. Choke	0Ω		83-64245				
L6	Cathode Choke	0Ω		83-64246				
L7	RF Coil	0Ω						
L8	UHF IF Output	0Ω		83-64661				Tapped
L9A	VHF Ant. Coil	0Ω	0Ω	103G-24771				Channel 2
B	VHF Ant. Coil	0Ω	0Ω	103G-24772				Channel 3
C	VHF Ant. Coil	0Ω	0Ω	103G-24773				Channel 4
D	VHF Ant. Coil	0Ω	0Ω	103G-24774				Channel 5
E	VHF Ant. Coil	0Ω	0Ω	103G-24775				Channel 6
F	VHF Ant. Coil	0Ω	0Ω	103G-24776				Channel 7
G	VHF Ant. Coil	0Ω	0Ω	103G-24777				Channel 8
H	VHF Ant. Coil	0Ω	0Ω	103G-24778				Channel 9
I	VHF Ant. Coil	0Ω	0Ω	103G-24779				Channel 10
J	VHF Ant. Coil	0Ω	0Ω	103G-24780				Channel 11
K	VHF Ant. Coil	0Ω	0Ω	103G-24781				Channel 12
L	VHF Ant. Coil	0Ω	0Ω	103G-24782				Channel 13
M	VHF Ant. Coil	0Ω		103G-24799				
L10	Neut. Coil	0Ω		103G-24795				
L11A	VHF RF, Mixer Grid, Osc. Coil	0Ω		103G-24783				Channel 2
B	VHF RF, Mixer Grid, Osc. Coils	0Ω		103G-24784				Channel 3
C	VHF RF, Mixer Grid, Osc. Coils	0Ω		103G-24785				Channel 4
D	VHF RF, Mixer Grid, Osc. Coils	0Ω		103G-24786				Channel 5
E	VHF RF, Mixer Grid, Osc. Coils	0Ω		103G-24787				Channel 6
F	VHF RF, Mixer Grid, Osc. Coils	0Ω		103G-24788				Channel 7
G	VHF RF, Mixer Grid, Osc. Coils	0Ω		103G-24789				Channel 8
H	VHF RF, Mixer Grid, Osc. Coils	0Ω		103G-24790				Channel 9
I	VHF RF, Mixer Grid, Osc. Coils	0Ω		103G-24791				Channel 10
J	VHF RF Mixer Grid, Osc. Coils	0Ω		103G-24792				Channel 11
K	VHF RF Mixer Grid, Osc. Coils	0Ω		103G-24793				Channel 12
L	VHF RF, Mixer Grid, Osc. Coils	0Ω		103G-24794				Channel 13
L12	Fil. Choke	0Ω		83-64247				
L13	Conv. Plate	.1Ω		103G-24798				
L14	1st Video IF			13A-24203	17-5002∗	TV-127∗	6232∗	Includes 4L 25MC Trap
L15	2nd Video IF	.1Ω	.1Ω	13A-24224	17-5001∗	TV-125∗	6231∗	
L16	3rd Video IF	.1Ω	.1Ω	13A-24224	17-5001∗	TV-125∗	6231∗	
L17	Series Peaking Coil	1.8Ω		16A-22427	19-1004		4610	7.5 Microhenries
L18	Shunt Peaking Coil	8.3Ω		16A-21391	19-1003		6155	305 Microhenries
L19	Series Peaking Coil	4.1Ω		16A-24210	19-1005		4612	10 Microhenries, Not used in chassis 21T26AGH.
L20A	4.5MC Trap	1.8Ω		201-25088				
B	1st Sound IF	3Ω						
L21	Shunt Peaking Coil	14Ω		16A-24375			6156	770 Microhenries
L22	4.5MC Trap	1Ω		201-24749	20-1004	TV-151	1469	Alternate part #16A-24505.
L23	2nd sound IF	.3Ω	.2Ω	201-23873			6203	
L24	Quadrature Coil	5Ω		201-23727	20-1005		1480	
L25	Horiz. Osc.	24Ω	5Ω	13E-24460			6313	
L26	Horiz. Phase	38Ω		13M-24441	20-1049▲	MWC-1	8314	Core Part No. 51A-24699
L27	RF Choke	1.7Ω		16A-21701	19-1005		4612	8 Microhenries

∗ Cut out chassis hole-use adaptor plate and use one winding only. Add 100MMFcap. externally.
■ Cut out chassis hole and use adaptor plate.
▲ Enlarge mounting hole.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE @ CURRENT 1000 ∿	REPLACEMENT DATA RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordorson PART No.	Triad PART No.
L28	.240ADC	42Ω	.6HY	16A-24655	C5041 ①		C-2339 ①	26C44①	C-23X ①
				16A-23889 ②					

① Drill one new mounting hole.
② Used in chassis 21T26AGH.

PARTS LIST AND DESCRIPTIONS (Continued)

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	RAYTHEON PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.270A	21J20097 21J23840 ①	1236A	RS300	6S300	6Q4	300	① Used in Ch. 21T26AGH
M2	.270A	21J20097 21J23840 ①	1236A	RS300	6S300	6Q4	300	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		RAYTHEON PART No.	SYLVANIA PART No.	
M3	1N82A	103G-24819	1N82A	UHF Mixer
M4	CK706A		1N60 / 1N132	Video Detector

MISCELLANEOUS

ITEM No.	PART NAME	RAYTHEON PART No.	NOTES
M5	Dial Light	47A-24271	Includes bracket - used in chassis 21T26AGH, 21T274AGH
M6	Tuner	D2U-24585	VHF-UHF - Chassis 21T193AGH
	Tuner	D2U-24245	VHF-UHF - Chassis 21T26AGH, 21T27AGH
M7	Tuner	D2U-24246	VHF - Chassis 21T274AS
M8	Trap	103G-24800	VHF Ant. Input Filter - Chassis 21T26AGH, 21T274AGH, 21T193AGH
	Trap	102S-24532	VHF Ant. Input Filter - Chassis 21T274AS
M9	Video Detector Assembly	13B-24206	Includes M4, coils & capacitors
M10	Switch	201-24479	Local-Fringe - (SPDT-Slide type)
M11	Centering Device	16M-24493	Models UM-2182C, UM-2182G, UM-2183A, UM-2183C, UM-2183G, UM-2183K, C-2168, UC-2168
	Centering Device	16M-23770	Model UC-2167
M12	Ion Trap	16M-19706	
M13	Correction Magnet	16M-24935	Models C-2168, UC-2168
	Correction Magnet	16M-22607	Model UC-2167
	Cabinet	2B-24662-A145	Top - Models UM-2182C, UM-2183C
	Cabinet	2B-24662-A147	Top - Models UM-2182G, UM-2183G
	Cabinet	2B-24662-A169	Top - Model UM-2183A
	Cabinet	2B-24662-A148	Top - Model UM-2183K
	Cabinet	2B-24660- A145	Bottom - Models UM-2182C, UM-2183C
	Cabinet	2B-24660-A147	Bottom - Models UM-2182G, UM-2183G
	Cabinet	2B-24660-A169	Bottom - Model UM-2183A
	Cabinet	2B-24660-A148	Bottom - Model UM-2183K
	Cabinet	24D-24606	Model UC-2167- Mahogany
	Cabinet	24D-24607	Model UC-2167 - Blonde
	Cabinet	24D-24608	Models UC-2168, C-2168- Mahogany
	Cabinet	24D-24609	Models UC-2168, C-2168 - Blonde
	Knob	5B-24636-A93	Fine tuning - Models UM-2182C, UM-2182G, UM-2183A, UM-2183C, UM-2183G, UM-2183K
	Knob	5B-24280-A29	Fine tuning - Models UC-2167, UC-2168
	Knob	5B-24136-A29	Fine tuning - Model C-2168
	Knob	5B-24635-A93	VHF Station Selector- Models UM-2182C, UM-2182G, UM-2183A, UM-2183C, UM-2183G, UM-2183K
	Knob	5B-24279-A76	VHF Station Selector - Model UC-2167 - Mahogany
	Knob	5B-24279-A93	VHF Station Selector - Model UC-2167 - Blonde
	Knob	5B-24914-A76	VHF Station Selector - Model UC-2168 - Mahogany
	Knob	5B-24914-A93	UHF Station Selector - Model UC-2168 - Blonde
	Knob	5B-24913-A76	VHF Station Selector - Model C-2168 - Mahogany
	Knob	5B-24913-A93	VHF Station Selector - Model C-2168 - Blonde
	Knob	5B-24613-A29	UHF Indicator - Models UM-2182C, UM-2182G, UM-2183A, UM-2183C, UM-2183G, UM-2183K
	Knob	5B-24281-A29	UHF Indicator - Models UC-2167, UC-2168
	Knob	5B-24616-A93	Contrast - Models UM-2182C, UM-2182G, UM-2183A, UM-2183C, UM-2183G, UM-2183K
	Knob	5B-24489-A29	Contrast - Models UC-2167, UC-2168
	Knob	5B-24138-A29	Contrast - Model C-2168
	Knob	5B-25063-A93	On-off-volume - Models UM-2182C, UM-2182G, UM-2183A, UM-2183C, UM-2183G, UM-2183K
	Knob	5B-24139-A76	On-off-volume - Model UC-2167 - Mahogany
	Knob	5B-24139-A93	On-off-volume - Model UC-2167 - Blonde
	Knob	5B-24915-A76	On-off-volume - Models UC-2168, C-2168 - Mahogany
	Knob	5B-24915-A93	On-off-volume - Models UC-2168, C-2168 - Blonde
	Knob	5B-23839-A93	Control (3 used) - Models UM-2182C, UM-2182G, UM-2183A, UM-2183C, UM-2183G, UM-2183K
	Knob	5B-21240-A76	Control (3 used) Model UC-2167 - Mahogany
	Knob	5B-21240-A93	Control (3 used) Model UC-2167 - Blonde
	Knob	5B-21205-A76	Horizontal Hold - Models UC-2168, C-2168 - Mahogany
	Knob	5B-21205-A93	Horizontal Hold - Models UC-2168, C-2168 - Blonde
	Knob	5B-21206-A76	Vertical Hold - Models UC-2168, C-2168 - Mahogany
	Knob	5B-21206-A93	Vertical Hold - Models UC-2168, C-2168 - Blonde
	Knob	5B-21134-A76	Tone & brightness - Models UC-2168, C-2168 - Mahogany
	Knob	5B-21134-A93	Tone & brightness - Models UC-2168, C-2168 - Blonde
	Safety Glass	30M-24576	Models UM-2182C, UM-2182G
	Safety Glass	30M-24909	Models UM-2183A, UM-2183C, UM-2183G, UM-2183K
	Safety Glass	30M-21485	Model UC-2167
	Safety Glass	30M-24908	Models UC-2168, C-2168
	Mask	25M-24593-A106	Models UM-2182C, UM-2182G, UM-2183A, UM-2183C, UM-2183G, UM-2183K
	Mask	25M-23961-A163	Model UC-2167
	Mask	25M-24598-A171	Models UC-2168, C-2168

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
E. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V12, V13, V14 and V15. Check waveform W12.

If Satisfactory	If Unsatisfactory
Check T2, T4A, C88, C89, C91, C92, R90 and other associated components.	Check L25, L26, C79, C83, C84, C87, R84, R47, R85, R83, and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V13 and V14. Check M1 and M2. Check R90, R95, T2, T4A, C87 and other associated components.

BLOOMING

Check by substitution V13, V14 and V15. Check M1 and M2. Check T2, T4A, C85, C87, R90, R94, R95 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined "Weak or no Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V2, V3, V4, V5, V6, and V7. Check video IF components for failure or change of value. Raster, No Sound, No Picture, UHF, substitute V1.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

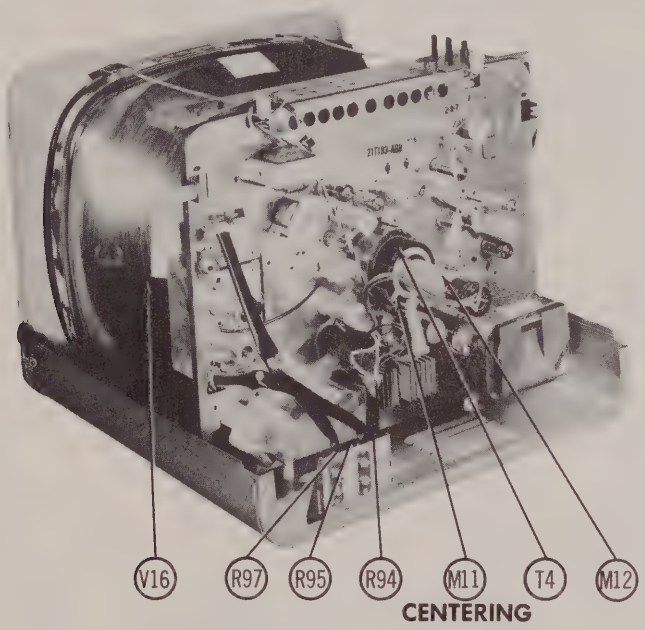
KEYSTONE EFFECT

Check T4 and its associated components.

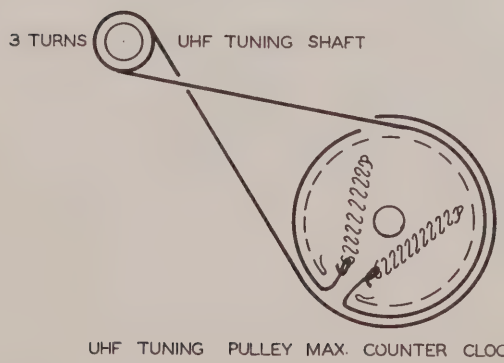
INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



CHASSIS—REAR VIEW



UHF DRIVE CORD STRINGING

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector, fine tuning knobs and UHF dial. The adjustments are accessible, one at a time, thru the small hole in cabinet top to the rear and slightly to the left of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions).

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

(See tube placement chart on page 5.)

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug (B1) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the buzz control located on top of chassis for maximum volume and minimum buzz.

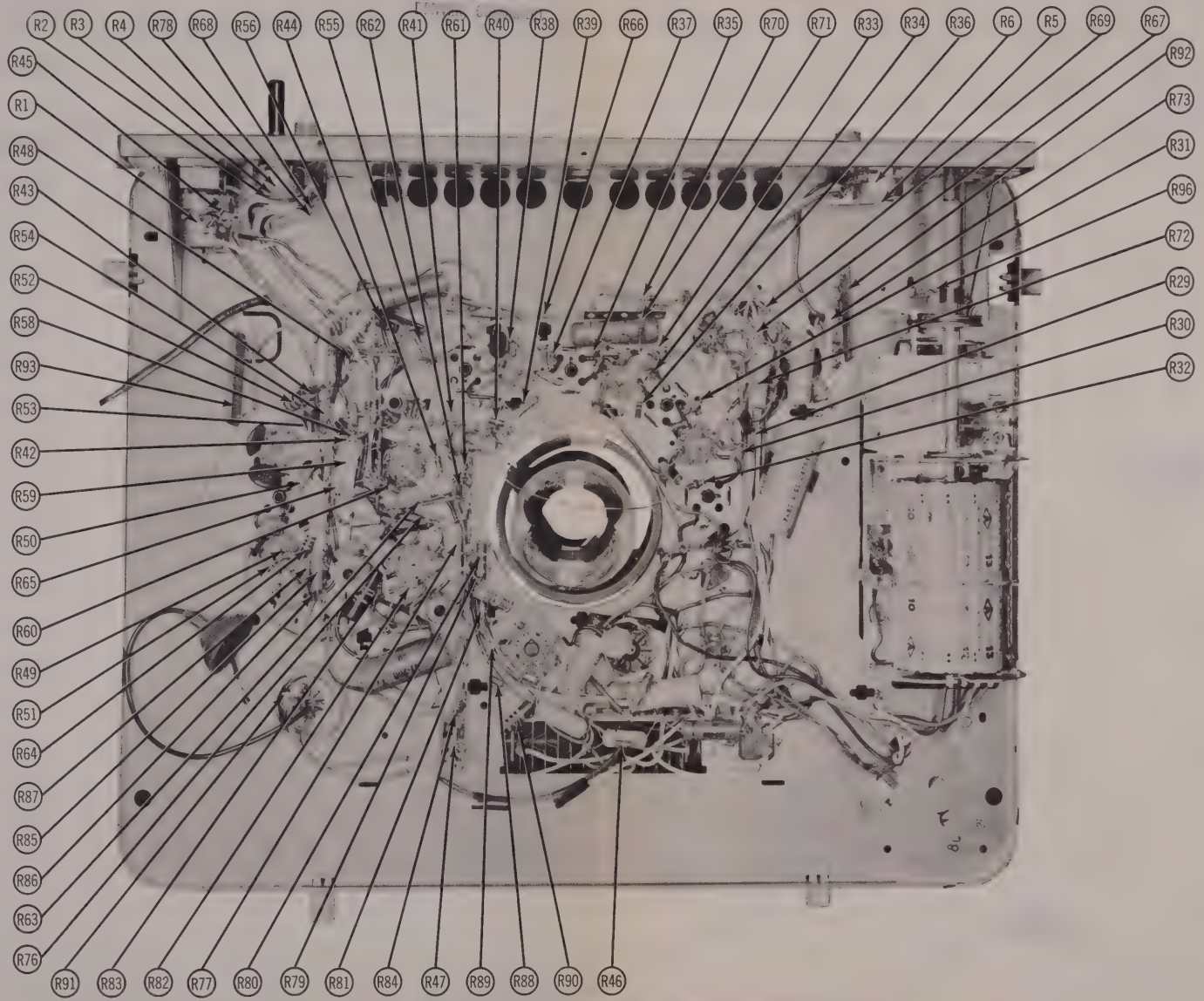
CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from top panel of cabinet.
2. Remove 5 metal screws. Remove rear cover.
3. Remove 2 metal screws. Remove "Local-Fringe" switch.
4. Remove 4 metal screws from sides and top of cabinet.
5. Slide side panel strips off runners toward rear of cabinet.
6. Lift top half of cabinet straight up.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

RETMA MEMBER

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

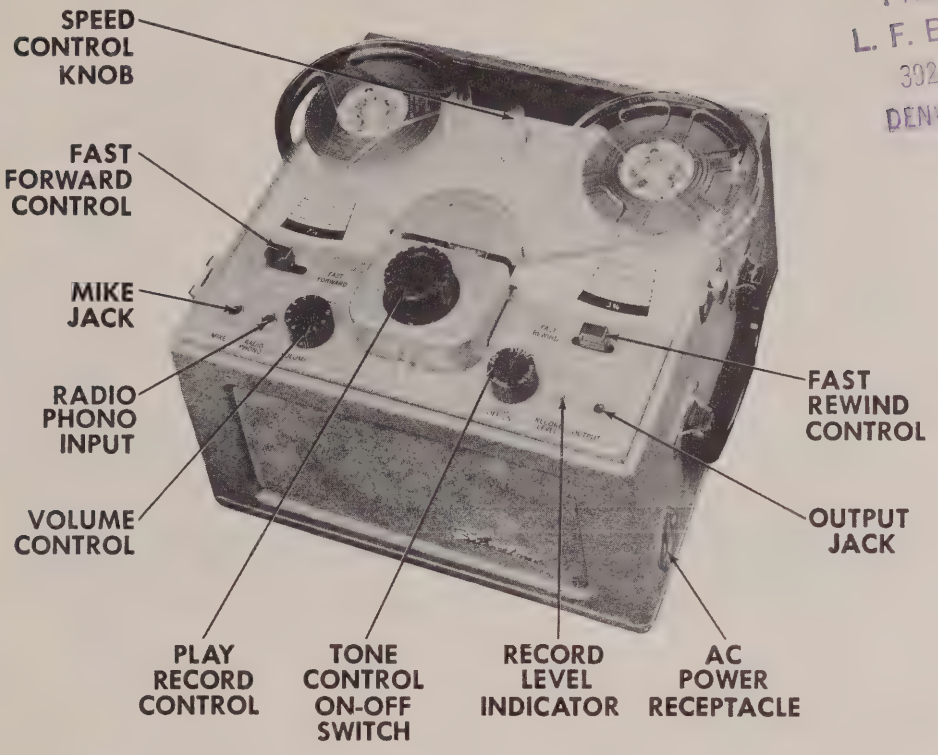


Figure 1

GENERAL INFORMATION

The Silvertone Models 4072 and 6072 are mechanically alike. The major difference between the two models is the amplifiers used. Notice the difference in the schematics located toward the rear of this manual.

Models 4072 and 6072 are designed to record and playback two tracks of material on stand - ard width recording tape, which doubles the recording and playing time with no loss of frequency response or quality. Recordings can be made from a radio, television receiver, or phonograph, in addition to those made directly from the microphone.

These recorders have two tape speeds, 3 3/4" and 7 1/2" per second. Using both tracks, the recording time is as follows:

Size Reel	3 3/4" Speed	7 1/2" Speed
5"	1 hour	1/2 hour
7"	2 hours	1 hour

Models 4072 and 6072 are designed to operate on 60 cycles, 110-120 volts, AC supply only. Before connecting to your line supply, be absolutely certain that it agrees with the above specification.

Supplied by:

Sears, Roebuck & Co.
925 S. Homan Street
Chicago 7, Illinois

SILVERTONE MODELS 4072 (Ch. 567.34000 & Amp. Ch. 567.35000), 6072 (Ch. 567.34003 & Amp. Ch. 567.35002)

This material compiled and published by

HOWARD W. SAMS & CO., INC., INDIANAPOLIS, INDIANA

Copyright 1955 • All Rights Reserved

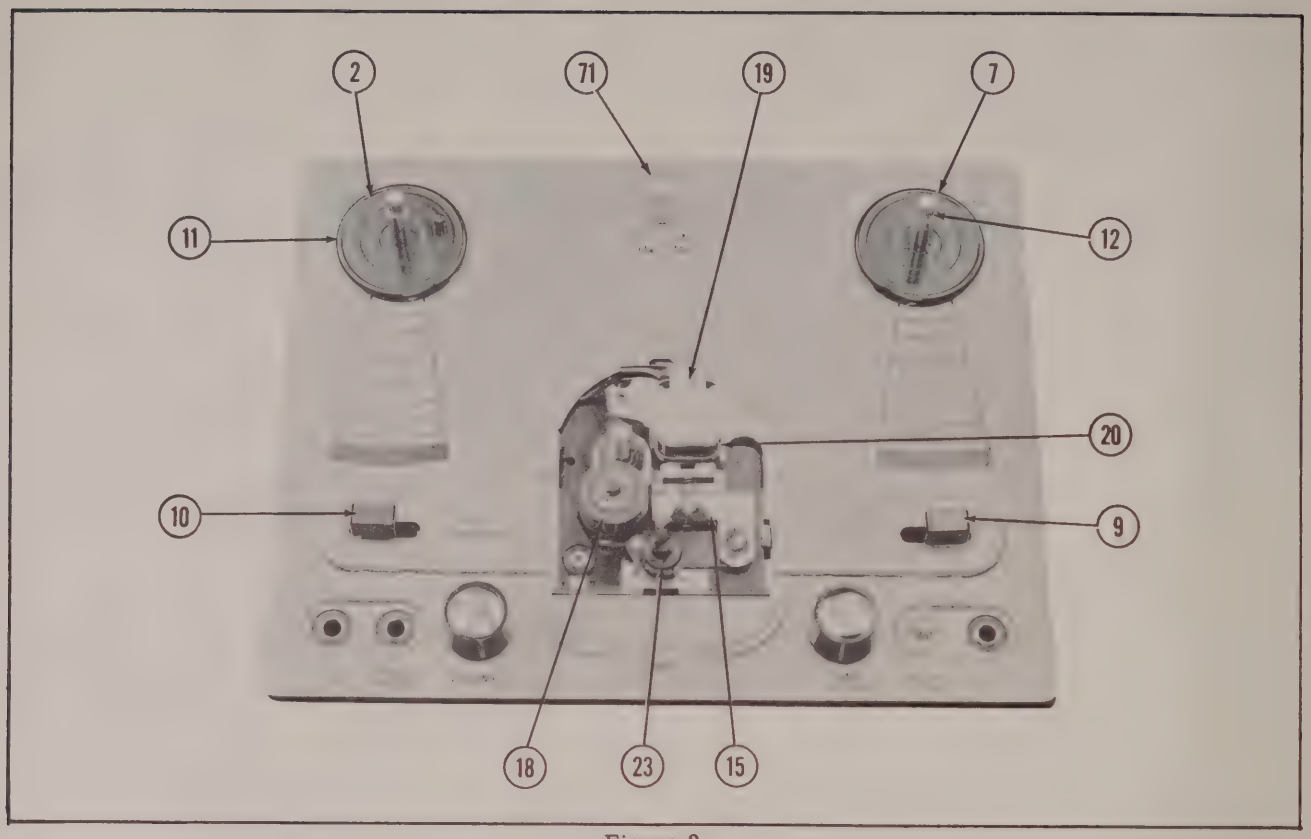


Figure 2

SPECIFICATIONS

Fast Forward Speed-

5" reel, 45 seconds.
7" reel, 90 seconds.

Fast Rewind Speed-

5" reel, 45 seconds.
7" reel, 90 seconds.

Frequency Response-

3 3/4" speed, 65 to 6000 cycles per sec.
7 1/2" speed, 65 to 8500 cycles per sec.

Power Output-

2 watts undistorted
3 watts maximum

Inputs-

Microphone, 1 Meg. Impedance
Radio-Phono, .5 Meg. Impedance.

Outputs-

Internal 5" Speaker.
External 3.2 Ohm Speaker.
External high impedance output for Ext. Amp. or Monitor in Record or Playback position.
External-Low impedance across 3.2 Ohm voice coil for Ext. Spkr.

Bias & Erase Frequency-

50 K.C.

OPERATING INSTRUCTIONS

Speed Control-

Changing speeds is accomplished by placing the speed button in the "Up" or "Down" position. "Up" for 3 3/4" per second and "Down" for 7 1/2" per second.

CAUTION: Do not operate this control unless the On-Off control is in the "On" position.

Threading The Tape-

1. Place a reel of tape on the right reel plate (7) and an empty reel on the left reel plate (2) making sure the reel slots engage the pins on the reel plates.

2. Unwind about 10" of tape from the reel. Hold a section of the tape straight with both hands and insert the tape in the tape slot making sure the dull coated side faces the rear of the recorder.

3. Insert the free end of the tape into one of the three radial slots in the hub of the empty reel. Turn the reel several turns, clockwise, until the tape is secured to the reel and all slack is taken up between reels.

To Record From Microphone-

1. Turn the On-Off Tone Control clockwise until a click is heard and allow about thirty seconds for the tubes to warm up.

2. Insert the microphone plug into the "Mike" jack.

3. Depress the play-record control knob (4) as far as it will go, turn clockwise until it locks while holding it down.

4. Hold the microphone about six inches from your mouth and speak in a normal voice. Adjust the

PROPERTY OF
L. F. SLAVKENGHIP
3924 MEADE ST.
DENVER, COLORADO

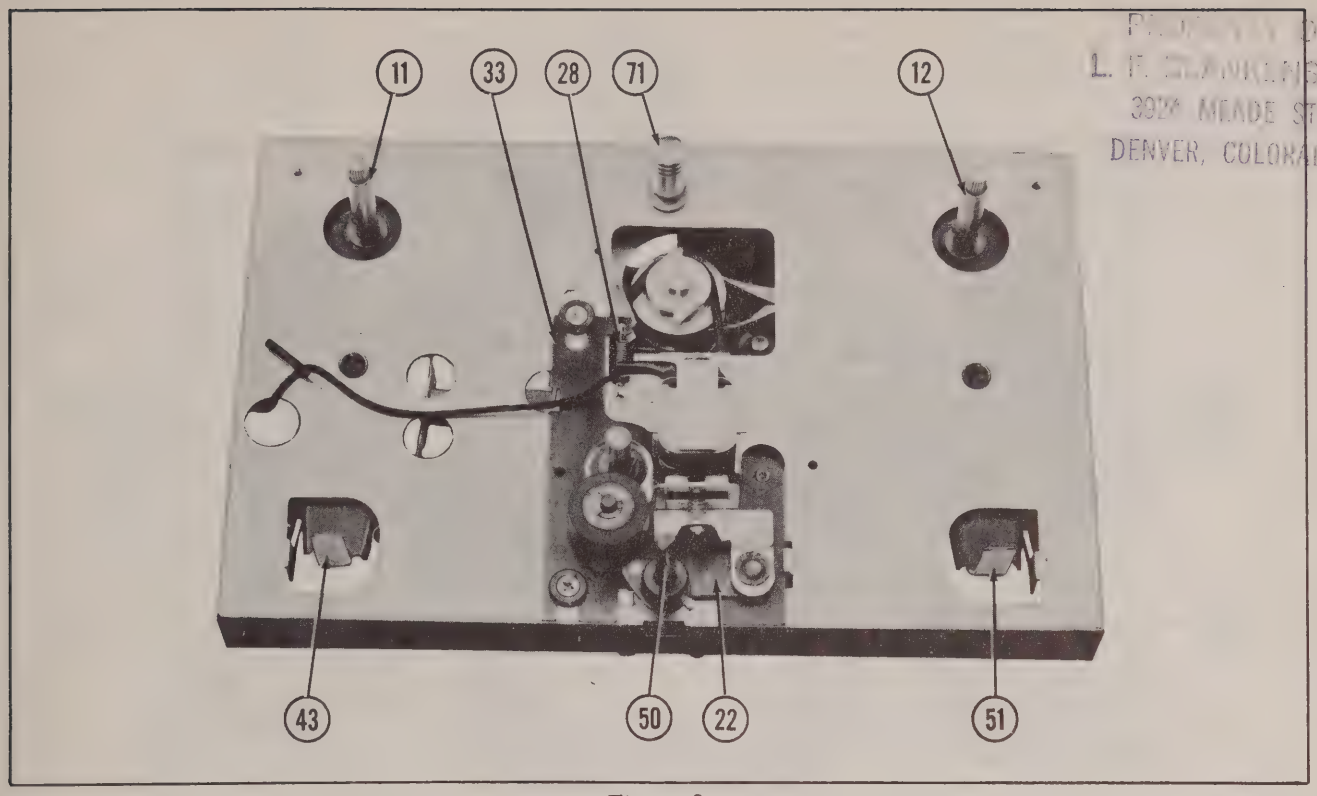


Figure 3

"Volume" control until the record level indicator flashes on the loudest sounds.

NOTE: Correct recording volume is very important. Too weak a signal, which does not cause the record level indicator to flash, will result in weak playback and high background noise. Too strong a signal, causing the level indicator to flash continuously, will result in distortion during playback.

To Record From Radio-

Recordings from a radio may be made by one of three ways:

1. Place the microphone about 6" to 12" in front of the radio speaker. Turn the radio volume control to a normal level. Setting it too high will cause distortion. Turn the radio tone control to maximum treble. Set the recording level and proceed with recording as described under "To Record From Microphone". This type of recording may not be satisfactory as other sounds may be picked up by the microphone which as a result will be recorded on the tape.

2. Have a shielded cable made up with a two conductor phone plug on one end and two alligator clips on the other end. Connect the alligator clips across the voice coil terminals on the radio speaker and insert the cord plug into the "Radio-Phono" jack. Set the radio volume and tone controls as described above. Set the recording level and proceed as described under "To Record From Microphone".

3. Have a shielded cable with a two conductor phone plug on one end and the other end connected across the radio volume control. Insert the phone plug into the "Radio-Phono" jack. Set the recording level and proceed with the recording as described under "To Record From Microphone". The position of the radio volume and tone controls has no effect on this set up and may be set anywhere.

To Record From Phonograph-

1. If the phonograph being used has a phone type plug on the pickup leads, insert it into the "Radio-Phono" jack. Set the recording level and proceed with the recording as described under "To Record From Microphone".

2. If the phonograph has a standard pin type plug which is more common, an adaptor is needed. Insert the pin plug into the adaptor and plug the adaptor into the "Radio-Phono" jack.

IMPORTANT: The recorder will not record from microphone or play back while a plug is inserted in the "Radio-Phono" jack.

To Record From Television Receiver-

1. Use one of the three methods described under "To Record From Radio" and proceed with the recording as described under "To Record From Microphone".

Dual Track Recording-

The Silvertone is designed so that only one-half the tape width is recorded at a time; thereby resulting in two track recording. This two track operation is accomplished in the following manner:

1. After a reel of tape has been recorded, i.e. all of the tape wound on to the take-up reel, turn the play-record control (4) to idle.

2. Remove the reels from the recorder, turning the full reel over and placing it on the right reel plate (7) and the empty reel on the left reel plate (2).

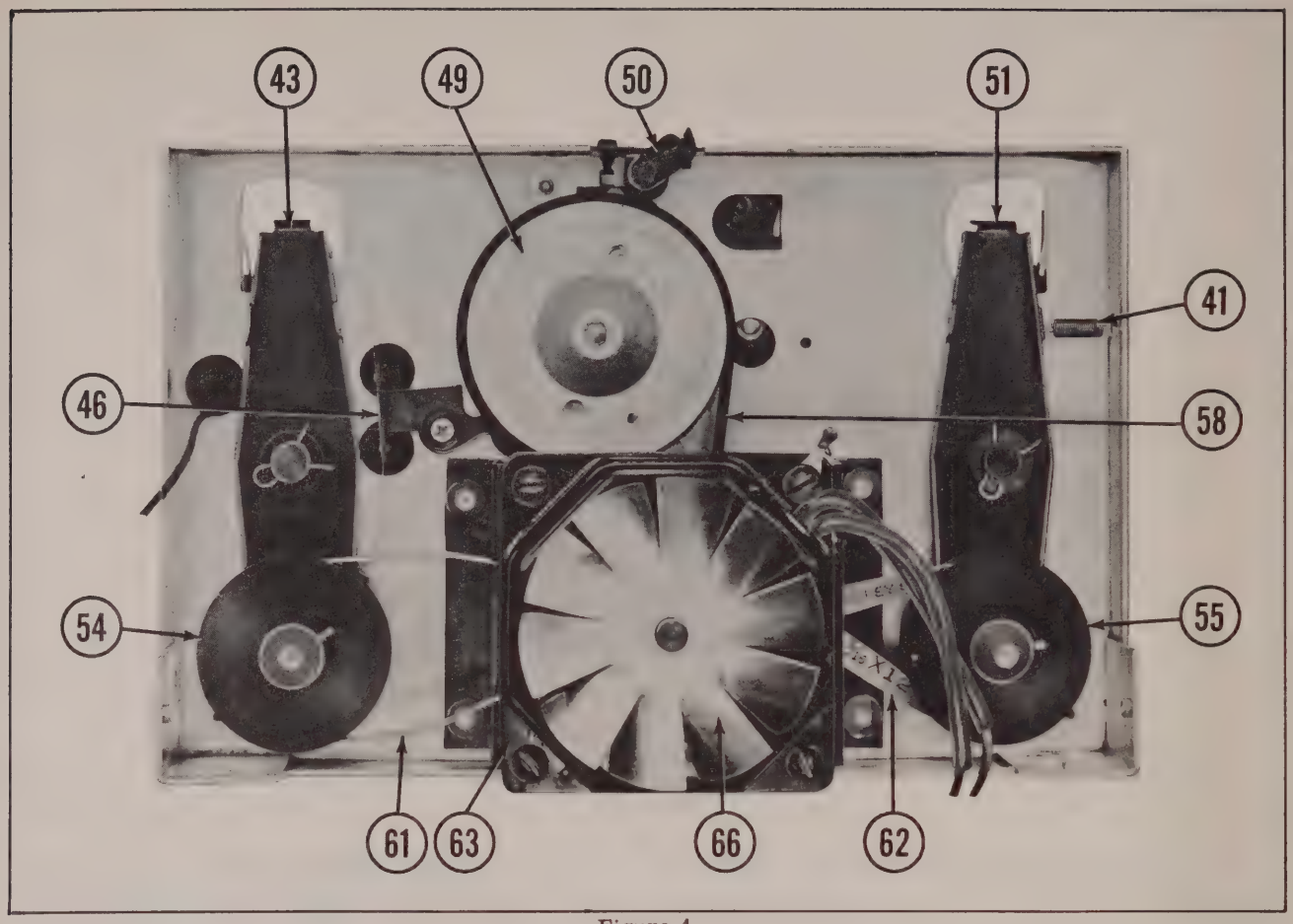


Figure 4

3. Properly thread the tape and proceed with the recording.

4. After this track has been recorded the first track of recording is ready to be played without rewinding, by reversing the reels as described in step 2 above.

Fast Forward And Fast Rewind-

High-speed forward or reverse can be obtained by pressing the desired knob (9 or 10) toward the head cover. Movement of these controls will wind the tape on the desired reel at a high speed as long as the control is held in this position. These are used primarily in locating a desired portion of a recording in a few seconds.

CAUTION: Do not attempt "Fast Forward" or "Fast Rewind" with the play-record control (4) on anything but idle position, as damage to the unit or breaking of the tape may result.

Braking-

The Silvertone is equipped with a quick stop when in high speed, either direction. Move both "Fast Forward" and "Fast Rewind" controls toward the head cover and then release both at the same time. For example: when in fast forward speed, continue to hold control and with the other hand move "Fast Rewind" control toward head cover. When machine stops, release both controls at the same time. If a coasting stop is desired, release control in motion and tape will glide to a momentum stop.

To Play A Recording-

1. Thread tape as described under "Threading the Tape".

2. Turn play-record control (4) clockwise without depressing until it locks.

3. Adjust the "Volume" and "Tone" controls for desired listening level.

To Use An Ext. Speaker-

Plug external speaker thru a three conductor plug into "Output Jack".

CAUTION: Do not insert plug into recorder without ext. speaker attached.

To Edit And Splice Tape-

NOTE: Since it is impossible to edit and splice one track without affecting the other, recordings which are to be edited should be limited to one track only.

1. The tape may be edited by cutting out unwanted portions, or by joining selections into another sequence. Announcements may be inserted between selections, etc. Unused sections of tape can be spliced together for re-use.

2. For best results, cut tape at a slight diagonal, join ends together with splicing tape on the glossy side and trim off any excessive width.

PROPERTY OF
L. F. BLANKENSHIP
3904 MEADE ST.
DENVER, COLORADO

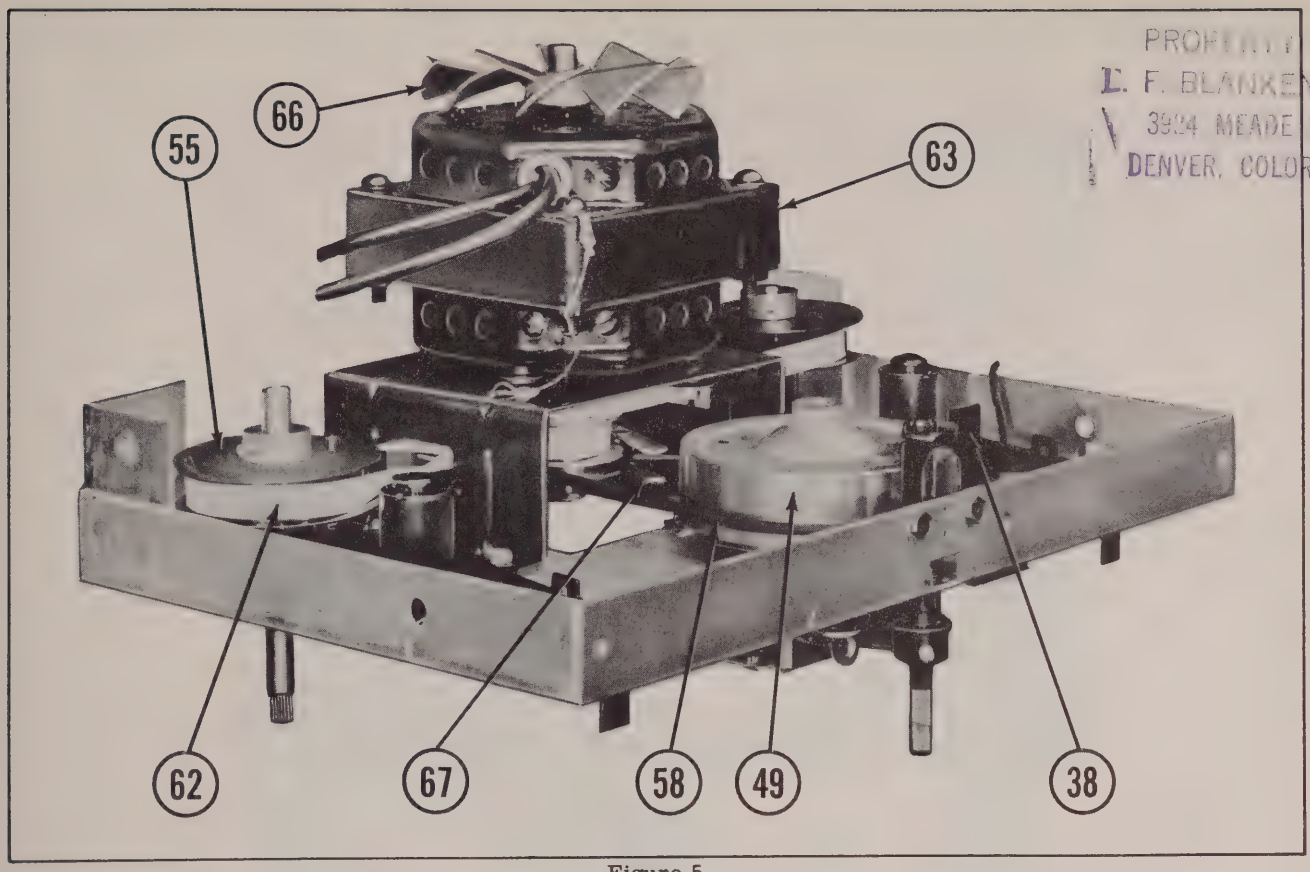


Figure 5

Erasing Recorded Material-

In the record position any recording on the tape is automatically erased before a new recording is put on the tape. If it is desired to erase a recording without putting anything on the tape follow the normal recording procedure, but leave the "Volume" control set at its extreme counterclockwise position.

To Use As A Public Address System-

1. Insert the microphone plug into the "Radio-Phono" jack.

2. Leave the play-record control (4) in idle position.

3. Speak into the microphone and adjust the "Volume" and "Tone" controls for desired level.

4. Do not have the microphone too close to the speaker or a feedback howl will result.

ADJUSTMENTS

Removing Unit From Case-

All service work except cleaning of the head and pressure roller and adjustment of the head and pressure pad assembly requires removal of the unit from the carrying case.

1. To remove unit from carrying case, disconnect power cord and remove the four Phillips head screws from bottom of case and carefully lift unit straight up and out.

Spindle (11 and 12) End Play Adjustments-

The spindles should have from 1/32" to 1/16" of up and down movement. Loosen the set screw in the pulley (54 or 55) and move the pulley up or down until the correct amount of end play is obtained.

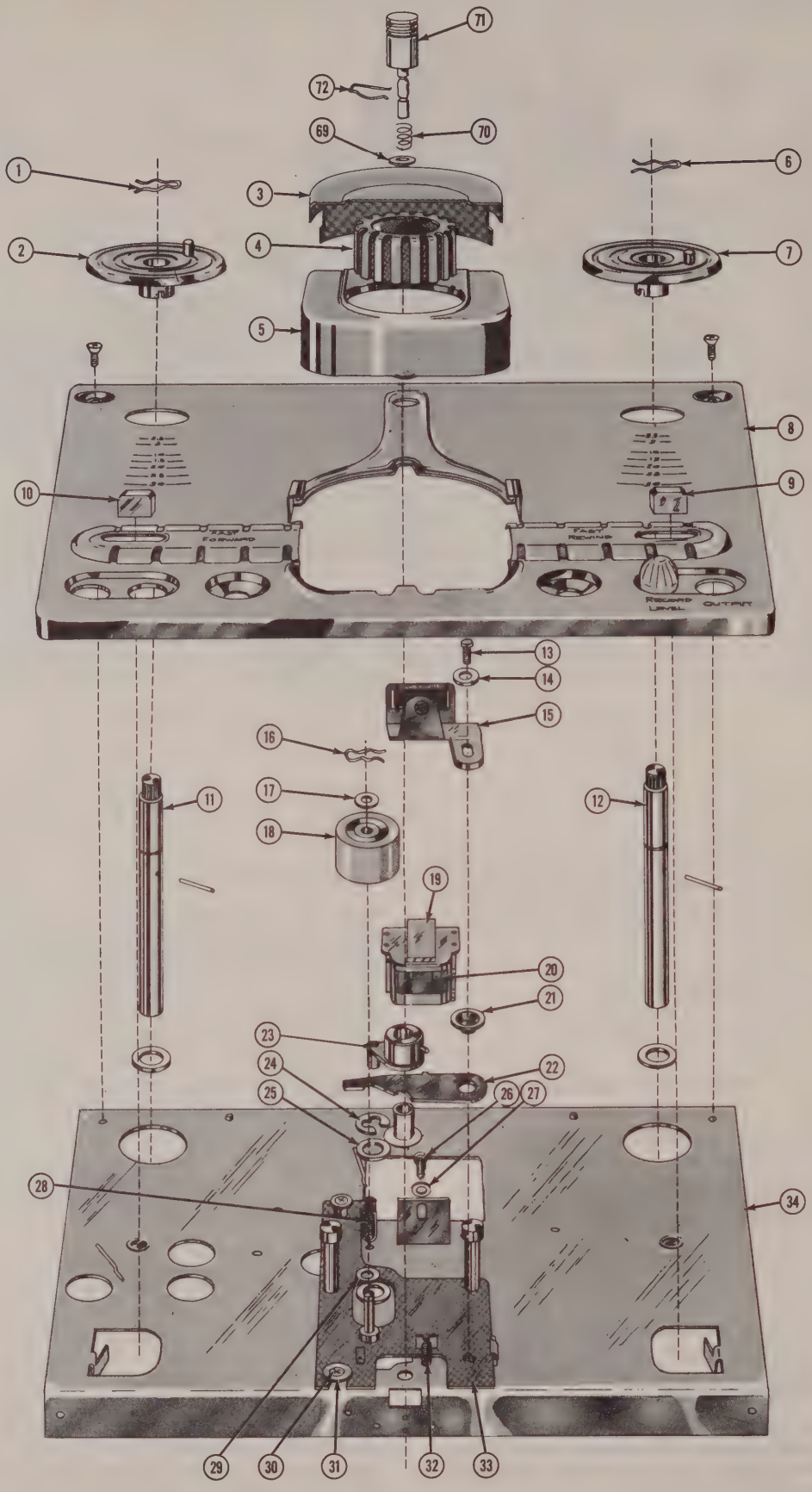
Take Up Spring (46) Adjustment-

Place a full 7" reel of tape on the take up reel plate (2). Rewind on the feed reel for about 10 seconds. Place the unit in the "Play" position. The take up reel should start revolving at the same time or a little after the capstan and pressure roller (18) start pulling tape. There should be no looping of the tape before it starts to take up. If the tape loops or doesn't take up at all, bend the take up lever spring (46) at point "A" on exploded view until the recorder takes up properly. Bending the spring outward will increase the take up while bending inward will decrease it.

CAUTION: Do not bend spring (46) to give too much take up or the tape will start to go into fast forward before the pressure roller reaches the capstan.

Take Up Reel Seat (2) And Feed Reel Seat (7) Drag Adjustment-

When the play-record control (4) is released, the reels should stop right away to prevent looping of the tape. Also when in fast forward or rewind and the control is released the reels should coast to a stop without looping the tape. The stop arms on the motorboard (point "B" on exploded view) that the take up and feed reel arms (43 and 51) rest against when the tape is not moving are what govern this. The stop arms should be bent to force the take up reel arm (43) and the feed reel arm (51) over far enough to take up enough belt tension so that the spindles just start to revolve without the reels in place. The play-record control (4) should be in its extreme counterclockwise position when making this adjustment. With the reels in place the spindles should not



A PHOTOFACT "EXPLODED" VIEW
© Howard W. Sams & Co., Inc. 1955

Figure 6A. Exploded View of Parts Above Baseplate.

PROPERTY OF
L. F. BLANKENS
3924 MEADE ST.
DENVER, COLORADO

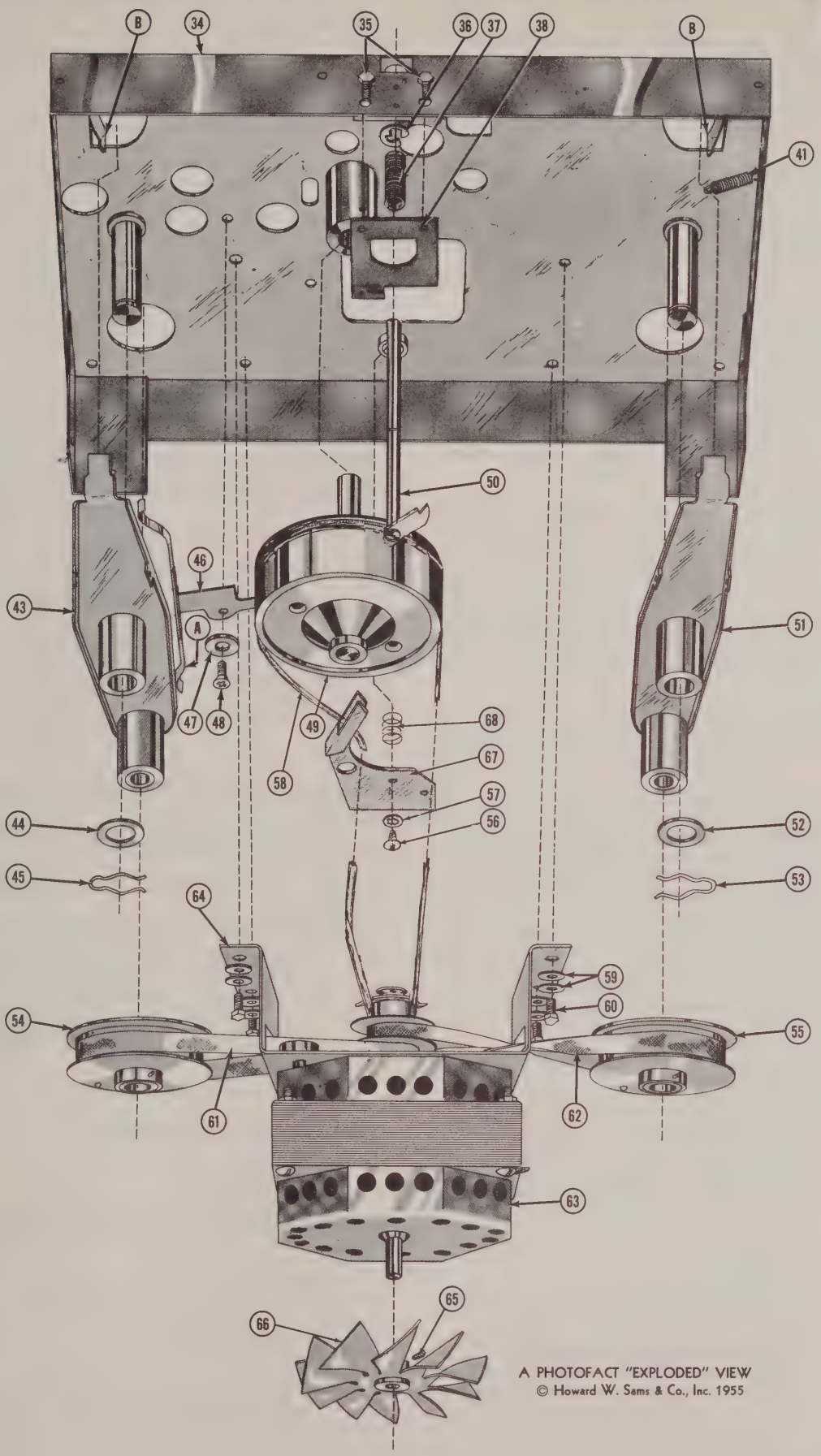


Figure 6B. Exploded View of Parts Below Baseplate.

revolve. If one or the other does, force the stop arm (point "B" on exploded view) over until it stops revolving.

Lifter Arm (23) Adjustment-

This adjusts the distance that the contact strip on the play-record switch will move when going into the record position. If an adjustment is necessary, depress and turn the play-record control (4) clockwise. Loosen the set screw in the lifter arm (23) and rotate control knob (4) to the left or right to center the contact strip with the contacts on the left end of the switch. Make sure lifter arm (23) is down as far as it will go and tighten its set screw.

Play-Record-Erase Head Adjustment-

It is very important that the head be lined up perfectly with the tape. If it is not, low output, loss of high frequencies or track overlap may result. If the head is to be replaced, the complete assembly of the head and the bracket (19) that it mounts in should be changed. The bracket is adjusted to the head and sealed in place at the factory. There are two adjustments to be made which are as follows:

1. One is the head height. This is set by placing a .179" gauge (between 11/64" and 3/16") on the motorboard (34) under where the head is mounted. The head is pushed down flush with this gauge and tightened in place and the gauge removed. If a gauge is not obtainable set the head height while the unit is pulling tape. Move the head slowly up until the top edge of the tape is hitting the edge of the tape guides on the motorboard.

2. The second adjustment is for output and frequency response. To set this make a recording of a 3000 cycle signal on a good unit. Place this on the unit that the head is to be aligned on. Connect an output meter or AC voltmeter across the speaker voice coil. Play the 3000 cycle tape, rock the head holder (19) back and forth, screw (26) holding the holder on to the motorboard bracket will allow you to do this, and notice the variation in the output voltage at the voice coil. Tighten the head holder in the position of highest output. Make sure the head was not moved up or down while rocking it. If a 3000 cycle signal tape cannot be made, record a record with some high notes on it on another unit. Play this back on the unit to be adjusted and rock the head to give best high note response.

After setting the height and output check unit for track overlap. To do this take a reel of tape that has no recording on it. Make a recording on the unit that the head has been adjusted on. Do not rewind but take the reels off, reverse them and play the other track. There should be no sound heard. If what was recorded is heard backwards then there is track overlap. If this is the case, the guide on the head holder should be bent up to move the tracks further apart.

Pressure Pad Adjustment-

This applies the correct pressure between the tape and the head. To adjust this, loosen screw (13) that holds pressure pad bracket (15). Turn play-record control (4) clockwise. Move bracket (15) forward until the pressure pad moves back against its spring 1/16". Make sure the front edge of the bracket is parallel with the head and tighten screw (13).

NOTE: When ordering a replacement head, be sure to get the complete assembly of head, plug and bracket. The bracket is adjusted to the individual head and sealed at the factory. Also, when ordering a replacement motor, be sure to get the complete assembly of motor, pulley and plug. The pulley is turned down on the individual motor and is not interchangeable.

Hum Balance Adjustment-

If tube V1 or V2 is replaced or the head changed the setting of the hum balance pot (R3) should be checked. To do this, connect an external speaker to the unit as described under "To Use An External Speaker". Connect an AC voltmeter with a .1 volt AC scale across the speaker voice coil. Turn the "Volume" and "Tone" controls clockwise. Place the play-record control (4) in "Play" position. Put the AC meter on the .1 volt scale and adjust the hum pot. (R3), which is located between tubes V1 and V2 on top of the chassis, to its minimum reading. It should not exceed .1 volt. This is the only adjustment required in the amplifier.

LUBRICATION

The lubricants applied at time of manufacture should be sufficient for a long period of time. Approximately once a year, or in the event that parts are replaced, lubricate the unit as follows:

With No. 20 Motor Oil-

1. Take up reel arm (43) bushing.
2. Feed reel arm (51) bushing.
3. Spindle (11 and 12) bearings.
4. Flywheel (49) bearings.
5. Pressure roller (18) bearing.

With Staput No. 312 grease or lubriplate-

1. Pressure plate (33) at the slide buttons and the guide on the right side.
2. On the stud of the lifter arm (23).

CAUTION: Do not oil the motor bearings unless absolutely necessary as excess oil will only be thrown off and cause slipping of the pulleys and rollers. Always use as little oil as possible. If oil should get on the pulleys and rollers wipe off with a petroleum solvent, such as alcohol. Do not use carbon tetrachloride.

TROUBLES

Won't Take Up Tape Properly-

1. Spindle (11) binding.
   (a) Lubricate.
2. Improper take up spring (46) adjustment.
   (a) See "Take Up Spring Adjustment".
3. Belt (61) slipping.
   (a) Clean motor pulley and pulley (54).
4. Belt (61) broken.
   (a) Remove bracket (64) and replace belt.
5. Set screw loose in pulley (54).
   (a) Tighten and leave 1/32" to 1/16" end play in spindle.
6. Pulley (54) broken.
   (a) Replace pulley.

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

Fast Forward Won't Function Properly-

1. See above except for step 2.

Fast Rewind Won't Function Properly-

1. Spindle (11 or 12) binding.
   (a) Lubricate.
2. Belt (62) slipping.
   (a) Clean motor pulley and pulley (55).
3. Belt (62) broken.
   (a) Remove bracket (64) and replace belt.
4. Set screw loose in pulley (55).
   (a) Tighten and leave 1/32" to 1/16" end play in spindle.
5. Pulley (55) broken.
   (a) Replace pulley.

Speed Variation or Wow-

1. Slippage.
   (a) Clean motor pulley, flywheel and capstan (49) and pressure roller (18) with a petroleum solvent, not carbon tetrachloride. Replace rubber rollers if they appear oil soaked.
2. Too much feed reel drag.
   (a) Check adjustment as described under "Take Up Reel Seat And Feed Reel Seat Drag Adjustment".
3. Flat spot on rubber roller (18).
   (a) A rapid thumping sound while the unit is running may indicate a flat spot on the rubber tire. If this condition does not clear up after several minutes of running time, replace the roller.

   (b) If the surface of the rubber roller is not smooth and even, replace the part.

   (c) Should the bearings of the rollers show signs of excessive wear or be extremely wobbly, the rollers should be replaced.
4. Tight feed or take up spindle (11 or 12)
   (a) Check adjustment as described under "Spindle End Play Adjustment".

   (b) Lubricate.
5. Tight pressure roller (18).
   (a) Lubricate.
6. Tight flywheel shaft (49).
   (a) Lubricate.
7. Pressure pad assembly (15) applying too much pressure against tape.
   (a) Check adjustment as described under "Pressure Pad Adjustment".

Stalling or Binding-

1. Speed control setting changed while unit not turned on. This should be done only when motor is running.

   (a) With motor turned "On", try moving speed control up and down several times.

Should the above fail, try holding the fast forward control (10) to the left as far as it will go and with the other hand manually rotate take-up reel spindle (6). If binding still continues it will be necessary to remove unit from case and free any binding action.

Speed Does Not Agree With Speed Setting-

1. Broken "ears" on motor drive pulley.

   (a) Replace entire motor.

Tape Creeps Out Of Tape Slot-

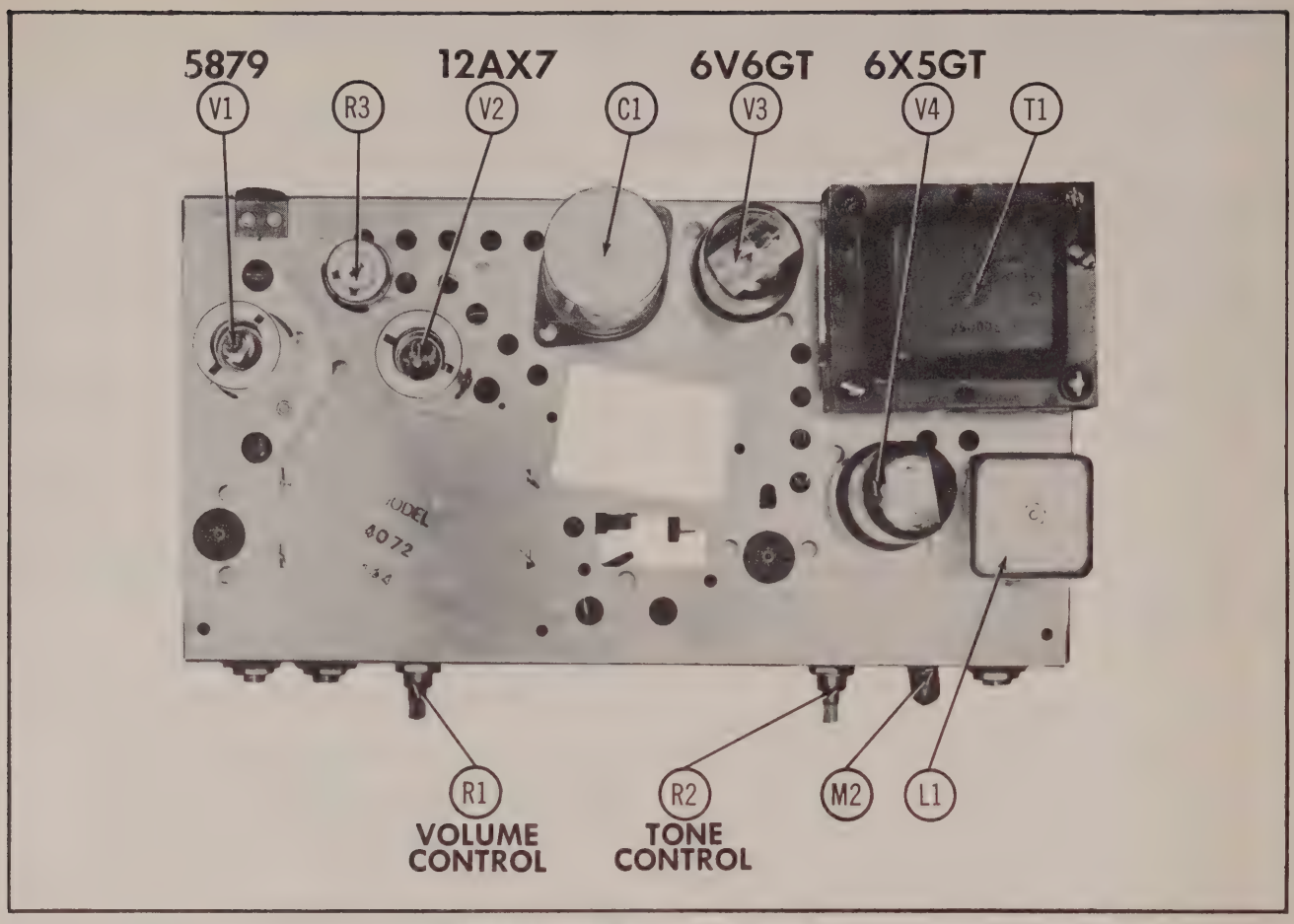
1. Head (20) improperly adjusted.

   (a) See "Play -Record -Erase Head Adjustment".

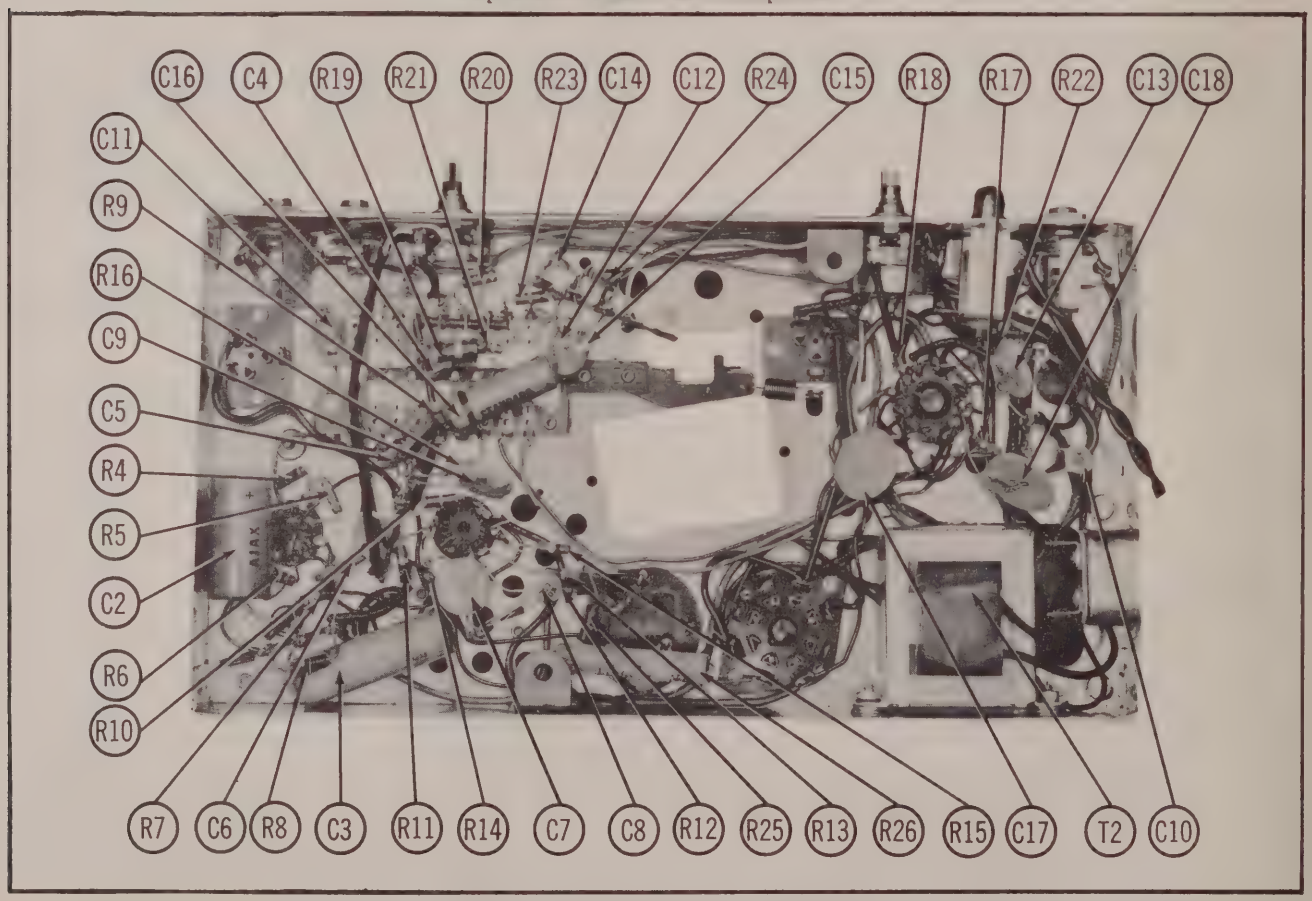
CLEANING

The record-playback head (20), capstan shaft and pressure roller (18) are subject to an accumulation of tape coating residue, which is worn off the tape as it passes these parts. This can cause distortion, weak output and poor erasure. Use a soft cloth and alcohol to clean the head surfaces, capstan and pressure roller.

CAUTION: Do not use a brush or any metallic object when cleaning the record-playback head as this could possibly mar the head surface.



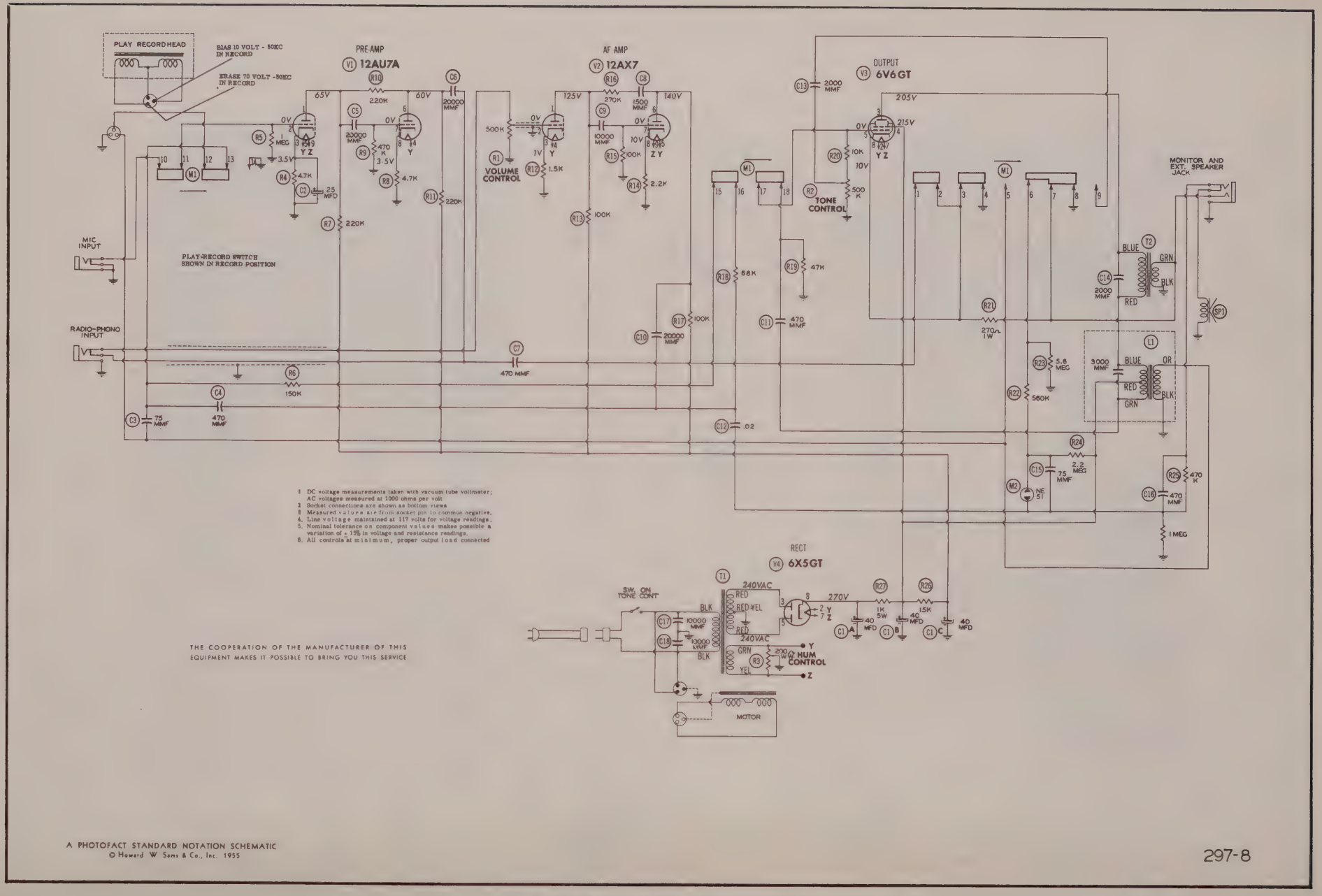
Top View - Model 4072 Amplifier



Bottom View - Model 4072 Amplifier

SILVERTONE MODELS 4072 (Ch. 567.34000 & Amp.
Ch. 567.35000), 6072 (Ch. 567.34003 & Amp. Ch. 567.35002)
Model 4072 Amplifier Schematic
297-8
THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
A PHOTOFACT STANDARD NOTATION SCHEMATIC
©Howard W. Sams & Co., Inc. 1955
PLAY-RECORD HEAD ASS'Y
BIAS 10 VOLTS - 50KC IN RECORD.
ERASE 70 VOLTS - 50KC IN RECORD
PLAY RECORD SWITCH SHOWN IN RECORD POSITION
MIC INPUT
RADIO-PHONO INPUT
PRE-AMP 5879
AF AMP 12AX7
OUTPUT 6V6GT
RECT 6X5GT
VOLUME CONTROL
TONE CONTROL
HUM CONTROL
SW. ON TONE CONT.
MOTOR
MONITOR AND EXT. SPEAKER JACK
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
RESISTANCE READINGS
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Resistance measurements made with ohmmeter.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Normal tolerance on component values makes possible a variation of ±10% without affecting performance.
6. All controls at minimum, proper output load connected.

SHIP
MEADE ST.
DENVER, COLORADO


PLAY RECORD HEAD
BIAS 10 VOLT - 50KC IN RECORD
ERASE 70 VOLT - 50KC IN RECORD
PRE-AMP
V1 12AU7A
AF AMP
V2 12AX7
OUTPUT
V3 6V6GT
VOLUME CONTROL
TONE CONTROL
MIC INPUT
RADIO-PHONO INPUT
PLAY-RECORD SWITCH SHOWN IN RECORD POSITION
MONITOR AND EXT. SPEAKER JACK
RECT
V4 6X5GT
SW ON TONE CONT
240VAC
HUM CONTROL
MOTOR
1 DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt
2 Socket connections are shown as bottom views
3 Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected
THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955
297-8

Model 6072 Amplifier Schematic

PROPERTY OF
L. E. FRANKENSHIN
3924 MEADE ST.
DENVER, COLORADO

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description
1	Y-460112	Hairpin Clip
2	Y-310186	Reel Plate
3	Y-100767-021	Head Cover
4	Y-310147	Record-Playback knob
5	Y-100687	Cover
6	Y-460112	Hairpin Clip
7	Y-310186	Reel Plate
8	Y-450083	Top Plate
9	Y-310185	Rewind Control Knob
10	Y-310185	Fast Forward Control Knob
11	Y-011319	Spindle (Includes Roll Pin)
12	Y-011319	Spindle (Includes Roll Pin)
13	Y-600180	Screw #6-32 x 5/16 Hex. Hd.
14		Flat Washer, .142 x 5/16 x 1/32
15	Y-011315	Pressure Bracket
16	Y-460111	Hairpin Clip
17	Y-580143	Washer, Cloth
18	Y-011236	Pressure Roller
19	Y-100556	Head Holder
20	Y-011312	Play-Record-Erase Head, Head Holder, Cable and Plug Assembly
21	Y-200288	Washer, Slide Button Spacer
22	Y-100658	Tension Arm
23	Y-011307	Pusher Stud; includes Set Screw
24	Y-460018	Flywheel Retainer
25	Y-580141	Flat Washer
26	Y-600113	Screw, 8-32 x 5/16 Hex. Hd.
27	Y-580056	Flat Washer
28	Y-420105	Pressure Plate Return Spring
29	Y-580143	Cloth Washer
30	Y-600243	Phillips Flat Hd. M. S., 6-32 x 1/4
31	Y-200288	Slide Button
32	Y-420110	Tension Arm Spring
33	Y-011821	Pressure Plate; Includes Pressure Roller Stud, Bearing Spring and tape Guide Studs
	Y-011314	Pressure Plate; Includes Pressure Roller Stud, Bearing Spring, but does not include Tape Guide Studs
34	Y-011690	Base Plate; includes staked and riveted parts
35	Y-600111	Hex. Hd. M. S., #6-32 x 1/4
36	Y-460117	Control Shaft Retainer
37	Y-420109	Record Release Spring
38	Y-100660	Control Shaft Bracket
41	Y-420107	Spindle Arm Spring
43	Y-011329	Take-up Arm Assembly
44	Y-580156	Steel Washer
45	Y-460110	Hairpin Clip
46	Y-011328	Take-up Lever & Spring Assembly
47	Y-200288	Slide Button
48	Y-600243	Phillips Flat Hd. M. S., 6-32 x 1/4
49	Y-011694	Flywheel & Capstan Shaft Assembly
50	Y-011308	Control Shaft & Lever Assembly
51	Y-011330	Rewind Arm
52	Y-580156	Steel Washer
53	Y-460110	Hairpin Clip
54	Y-011317	Pulley & Set Screw Assy.
55	Y-011317	Pulley & Set Screw Assy.
56		Screw
57		Lockwasher
58	Y-490087	Rubber Belt
59	Y-580056	Flat Washer
60	Y-600137	Hex. Hd. M. X., 8-32 x 1/4
61	Y-490053	Take-up Drive Belt
62	Y-490053	Rewind Drive Belt
63	Y-011692	Motor, Pulley, Cable and Plug
64	Y-100654	Motor Mounting Bracket
65	Y-600153	"Allen" Set Screw, 8-32 x 3/16
66	Y-011321	Motor Fan; Includes Set Screw
67	Y-100760	Speed Control Bracket
68	Y-420151	Speed Control Spring (Lower)
69	Y-320054	Rubber Washer
70	Y-420151	Speed Control Spring (Upper)
71	Y-011693	Speed Control Knob
72	Y-420152	Speed Control Shaft Retainer

ELECTRICAL PARTS LIST

Model 4072

Ref. No.	Part No.	Description
V1	Y730031	5879, Pre-Amp.
V2	Y730022	12AX7, A. F. Amp.
V3	Y730004	6V6GT, Output
V4	Y730005	6X5GT, Rectifier
C1A	Y770088	Elect. Cap., 40MFD @ 300V.
C1B		Elect. Cap., 40MFD @ 300V.
C1C		Elect. Cap., 40MFD @ 300V.
C2	Y770003	Elect. Cap., 25MFD @ 25V.
C3		Cap., Molded Paper, .1MFD @ 400V.
C4	Y770097	Cap., Ceramic, 75MMF, 10%
C5	Y770090	Cap., Ceramic, 470MMF, 10%
C6	Y770095	Cap., Ceramic, 20000MMF, 20%
C7	Y770096	Cap., Ceramic, 10000MMF, 20%
C8	Y770094	Cap., Ceramic, 750MMF, 10%
C9	Y770095	Cap., Ceramic, 20000MMF, 20%
C10	Y770090	Cap., Ceramic, 470MMF, 10%
C11	Y770090	Cap., Ceramic, 470MMF, 10%
C12	Y770093	Cap., Ceramic, 2000MMF, 20%
C13	Y770093	Cap., Ceramic, 2000 MMF, 20%
C14	Y770097	Cap., Ceramic, 75MMF, 10%
C15	Y770090	Cap., Ceramic, 470MMF, 10%
C16	Y770008	Cap., Molded Paper, .02MFD @ 400V.
C17	Y770096	Cap., Ceramic, 10000MMF @ 400V.
C18	Y770096	Cap., Ceramic, 10000MMF @ 400V.
R1	Y740051	Volume Control, 500K
R2	Y740052	Tone Control & Switch, 500K
R3	Y740045	Hum Control, 200Ω, W. W.
R4	Y760001	Resistor, 1Meg., 1/2W.
R5	Y760025	Resistor, 820Ω, 1/2W.
R6	Y760064	Resistor, 150K, 1/2 W. Use a 220K, (Note Some Models 1/2 W. In This Application)
R7	Y760048	Resistor, 390K, 1/2 W.
R8	Y760015	Resistor, 220K, 1/2 W.
R9	Y760064	Resistor, 150K, 1/2 W.
R10	Y760003	Resistor, 1.5K, 1/2 W.

ELECTRICAL PARTS LIST-Con't.

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
R11	Y760010	Resistor, 100K, 1/2 W.	R22	Y760040	Resistor, 2. 2Meg, 1/2 W.
R12	Y760047	Resistor, 2. 2K, 1/2 W.	R23	Y760001	Resistor, 1Meg, 1/2 W.
R13	Y760010	Resistor, 100K, 1/2 W.	R24	Y760037	Resistor, 470K, 1/2 W.
R14	Y760052	Resistor, 270K, 1/2 W.	R25	Y760027	Resistor, 15K, 1/2 W.
R15	Y760010	Resistor, 100K, 1/2 W.	R26	Y760304	Resistor, 1K, 4W., W. W.
R16	Y760062	Resistor, 68K, 1/2 W.	T1	Y700054	Power Transformer
R17	Y760013	Resistor, 47K, 1/2 W.	T2	Y700055	Output, Transformer
R18	Y760019	Resistor, 10K, 1/2 W.	L1	Y700056	Osc. Coil
R19	Y760115	Resistor, 270Ω, 1 W.	M1	Y011301	Play-Record Switch
R20	Y760039	Resistor, 560K, 1/2 W.	M2	Y730006	Record Level Lamp Neon, NE51
R21	Y760054	Resistor, 5. 6Meg, 1/2 W.	SP1	Y011298	P. M. Speaker, 5 1/4"

ELECTRICAL PARTS LIST

Model 6072

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
V1		12AU7A, Pre. Amp.	R5	Y760001	Resistor, 1Meg., 1/2 W.
V2	Y730022	12AX7, A. F. Amp.	R6	Y760064	Resistor, 150K, 1/2 W.
V3	Y730004	6V6GT, Output	R7	Y760036	Resistor, 220K, 1/2 W.
V4	Y730005	6X5GT, Rectifier	R8	Y760017	Resistor, 4. 7K, 1/2 W.
C1A	Y770088	Elect. Cap., 40MFD@300V.	R9	Y760037	Resistor, 470K, 1/2 W.
C1B		Elect. Cap., 40MFD@300V.	R10	Y760036	Resistor, 220K, 1/2 W.
C1C		Elect. Cap., 40MFD@300V.	R11	Y760036	Resistor, 220K, 1/2 W.
C2	Y770003	Elect. Cap., 25MFD@25V.	R12	Y760003	Resistor, 1. 5K, 1/2 W.
C3	Y770097	Cap. Ceramic, 75MMF, 10%	R13	Y760010	Resistor, 100K, 1/2 W.
C4	Y770090	Cap. Ceramic, 470MMF, 10%	R14	Y760047	Resistor, 2. 2K, 1/2 W.
C5	Y770095	Cap. Ceramic, 20000MMF, 20%	R15	Y760010	Resistor, 100K, 1/2 W.
C6	Y770095	Cap. Ceramic, 20000MMF, 20T	R16	Y760052	Resistor, 270K, 1/2 W.
C7	Y770090	Cap. Ceramic, 470MMF, 10%	R17	Y760010	Resistor, 100K, 1/2 W.
C8	Y770098	Cap. Ceramic, 1500MMF	R18	Y760062	Resistor, 68K, 1/2 W.
C9	Y770096	Cap. Ceramic, 10000MMF, 20%	R19	Y760013	Resistor, 47K, 1/2 W.
C10	Y770095	Cap. Ceramic, 20000MMF, 20%	R20	Y760019	Resistor, 10K, 1/2 W.
C11	Y770090	Cap. Ceramic, 470MMF, 10%	R21	Y760115	Resistor, 270, , 1 W.
C12	Y770008	Cap. Molded Paper, . 02MFD@ 400V.	R22	Y760039	Resistor, 560K, 1/2 W.
C13	Y770110	Cap. Ceramic, 2000MMF, 20%	R23	Y760054	Resistor, 5. 6Meg, 1/2 W.
C14	Y770110	Cap. Ceramic, 2000MMF, 20%	R24	Y760040	Resistor, 2. 2Meg, 1/2 W.
C15	Y770097	Cap. Ceramic, 75MMF, 10%	R25	Y760037	Resistor, 470K, 1/2 W.
C16	Y770090	Cap. Ceramic, 470MMF, 10%	R26	Y760027	Resistor, 15K, 1/2 W.
C17	Y770096	Cap. Ceramic, 10000MMF@500V.	R27	Y760304	Resistor, 1K, 5W, W. W.
C18	Y770096	Cap. Ceramic, 10000MMF@400V.	T1	Y700054	Power Transformer
R1	Y740051	Volume Control, 500K	T2	Y700055	Output Transformer
R2	Y740052	Tone Control & Switch 500K	L1	Y700056	Osc. Coil
R3	Y740045	Hum Control, 200Ω, W. W.	M1	Y011301	Play-Record Switch
R4	Y760017	Resistor, 4. 7K, 1/2 W.	M2	Y730006	Record Level Lamp, NE51
			SP1	Y011298	P. M. Speaker, 5 1/4"

CABINET PARTS LIST-Model 4072

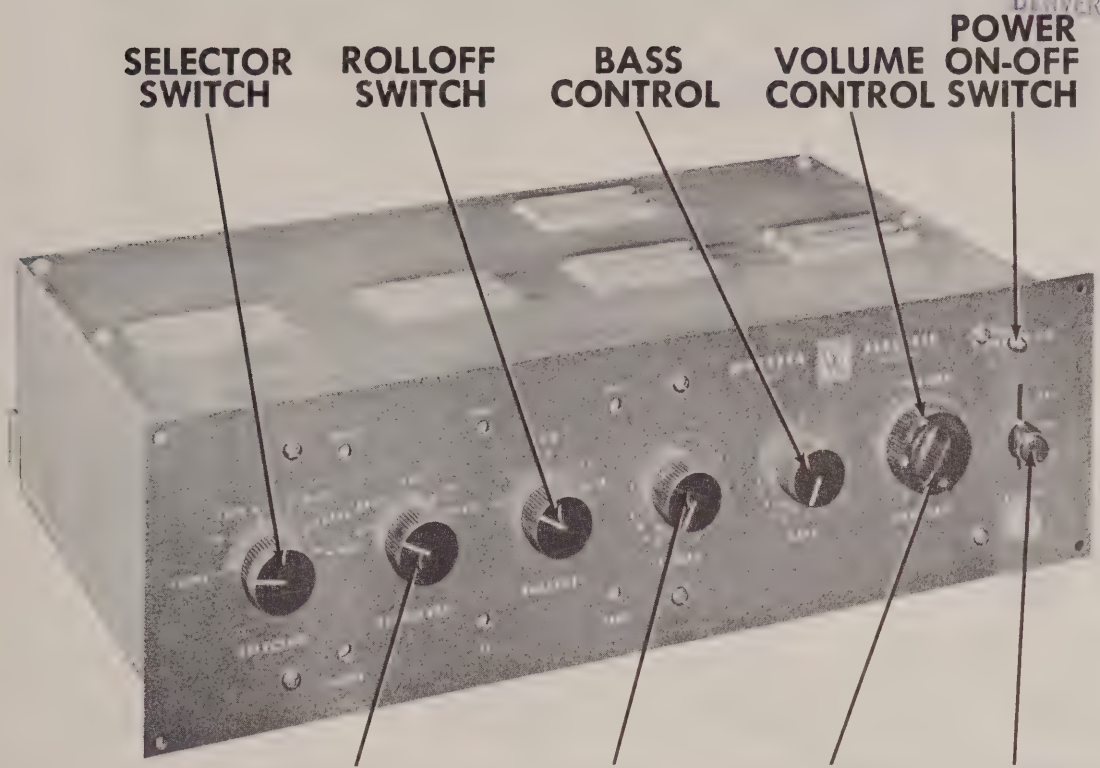
Part No.	Description
Y310165	Logo, "Silvertone"
Y310167	Take-up Reel, 5"(Empty)
Y310168	Reel with Tape, 5", Silvertone
Y100646	Escutcheon, AC
Y100072	Vent Screen
Y310194	Knob, Volume Control
Y310195	Knob, On-Off-Tone Control
Y440108	Cabinet (Includes Cover)
Y720057	Microphone

CABINET PARTS LIST-Model 6072

Part No.	Description
Y310165	Logo, "Silvertone"
Y310167	Take-up Reel, 5"(Empty)
Y310168	Reel with Tape, 5", Silvertone
Y100646	Escutcheon, AC
Y100072	Vent Screen
Y310194	Knob, Volume Control
Y310195	Knob, On-Off-Tone Control
Y440172	Cabinet (Includes Cover)
Y720057	Microphone

PROPERTY OF
L. F. [illegible] SHIP
[illegible] ST.
DENVER, COLORADO

L. F. [illegible]
3824 MEADE ST
DENVER, COLORADO



WEBSTER-ELECTRIC
MODEL 97-0

TRADE NAME	Webster-Electric Model 97-0
MANUFACTURER	Webster-Electric Co., Racine, Wisc.
TYPE SET	AC Operated Six Channel Audio Preamplifier & Equalizer
TUBES (Five)	Types: 12AY7 Preamp., 12AU7 Cath. Follower-AF Amp., 12AX7 Cath. Follower-AF Amp., 12AU7 AF Amp.-Cath. Follower, 6X4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .26 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Webster-Electric PART No.	STANDARD REPLACEMENT		
V1	Preamplifier	12AY7	12AY7	9A	
V2	Cathode Follower-AF Amplifier	12AU7	12AU7	9A	
V3	Cathode Follower-AF Amplifier	12AX7	12AX7	9A	
V4	AF Amplifier-Cathode Follower	12AU7	12AU7	9A	
V5	Rectifier	6X4	6X4	5BS	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	Webster-Electric PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲10	450	241-18800	FP376.8	TM-404010-450	T-165	
B	■40	450					
C	▬40	450					
C2A	▲40	450	241-14236	FP238	TM-D40-450	D-235	
B	▬40	450					
C3	50	6	S-6063	TC29	TD-50-6	MMT-650	
C4	50	6	S-6063	TC29	TD-50-6	MMT-650	
C5	50	6	S-6063	TC29	TD-50-6	MMT-650	
C6	2000	15	211-19796	WP041	TM-2000-15	S-025	

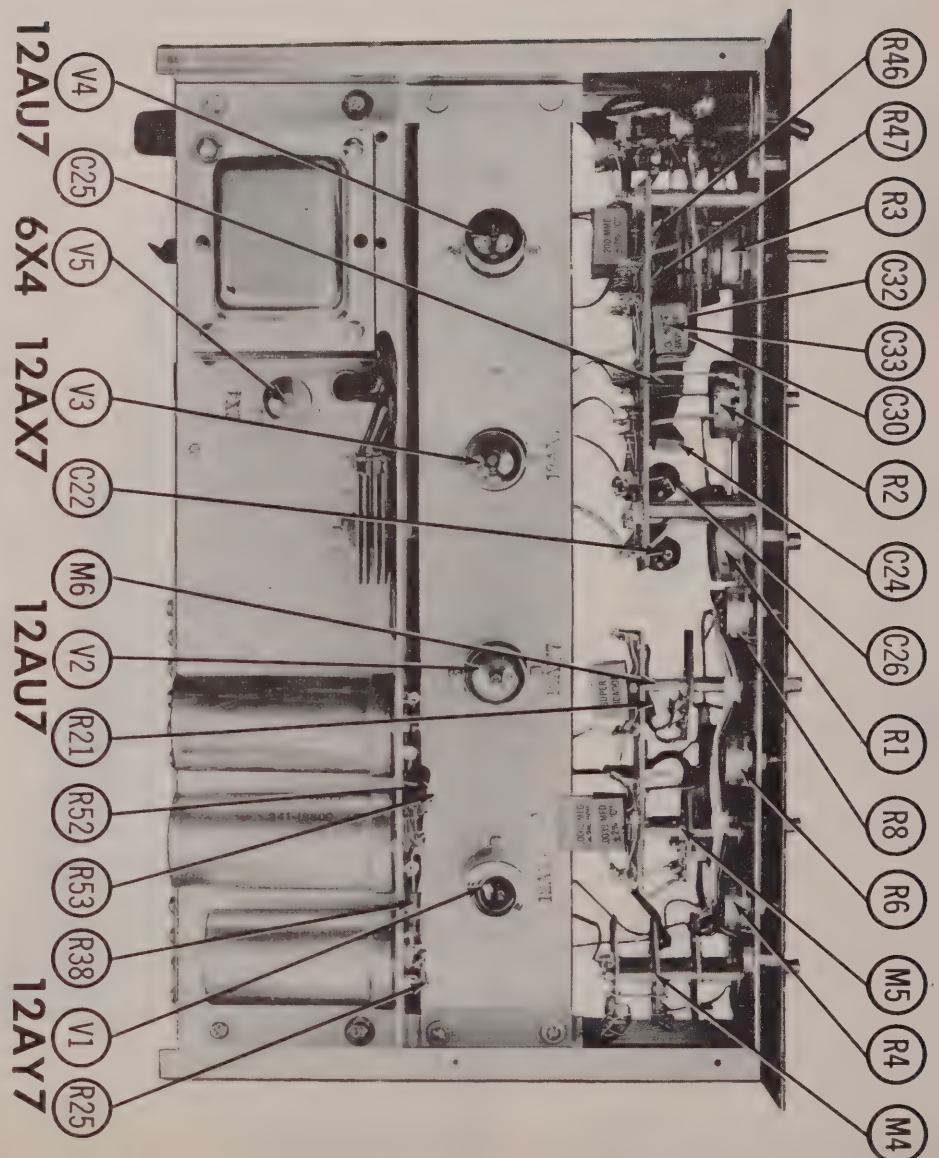
FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	Webster-Electric PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C7	25	500	29670-6	TCZ-25	NP0L-250	MC220	
C8	.047	400	211-15048	DF-503		PT417	
C9	5100	500	211-19826				
C10	3900	500	211-19825				
C11	6200	500	211-19831				
C12	.1	400	211-13083	DF-104		PT401	
C13	3000	500	211-19827			MCE461	
C14	2000	500	211-19828			MCE457	
C15	1000	500	211-19837			MCE255	
C16	510	500	211-19829				
C17	.047	400	211-15048	DF-503		PT4147	
C18	.1	400	211-13083	DF-104		PT401	
C19	.047	400	211-15048	DF-503		PT4147	
C20	6800	500	211-19838				
C21	.047	400	211-15048	DF-503		PT4147	
C22	.1	400	211-13083	DF-104		PT401	
C23	100		211-19832	TCZ-100	NP0-337-101	ZT-531	
C24	4700	500	211-19830				
C25	4700	500	211-19830				
C26	.1	400	211-13083	DF-104		PT401	
C27	300	500	211-19833			MCE241	
C28	510	500	211-19829				
C29	100	500	211-19832	TCZ-100		MCE235	
C30	240	500	211-19834	TCZ-240			
C31	.1	400	211-13083	DF-104		PT401	
C32	200	500	211-19835			MCE237	
C33	390	500	211-19836				
C34	200	500	211-19835			MCE237	
C35	100	500	211-19832	TCZ-100		MCE235	
C36	200	500	211-19835			MCE237	
C37	100	500	211-19832	TCZ-100		MCE235	
C38	.047	400	211-15048	DF-503		PT4147	
C39A	200		♦211-19804				
B	100						
C	4500						
D	4500						
C40	.47	200	211-18931			PT4047	

♦ Items C39A, C39B, C39C, C39D, R49A and R49B are included in part #211-19804.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Webster-Electric PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	211-19802	Q19-133X	A47F5-500K	BT-65	UT-431	Treble-Tapped @ 250KΩ
B	Shaft		Not Req.	Not Req.	RS-3	Not Req.	Not Req.	Attach to R1A
R2A	1Meg	½	211-19803	Q11-137	A47-1Meg-S	ABT-71	U-54	Bass tapped @ 500KΩ
B	Shaft		Not Req.	Not Req.	RS-3	AK-1	Not Req.	Attach to R2A
R3A	250KΩ	½	211-19804			F1-35		Volume
B	1Meg	½				RC2-200		Loudness-tapped @ 350KΩ and 650KΩ
R4A	500KΩ	½	211-19807			AB-58		Magnetic Level
B	Shaft		Not Req.			AK-1		Attach to R4A
R5A	500KΩ	½	211-19807			AB-58		Tuner Level
B	Shaft		Not Req.			AK-1		Attach to R5A
R6A	500KΩ	½	211-19807			AB-58		Crystal Level
B	Shaft		Not Req.			AK-1		Attach to R6A
R7A	500KΩ	½	211-19807			AB-58		TV level
B	Shaft		Not Req.			AK-1		Attach to R7A
R8A	500KΩ	½	211-19807			AB-58		Mic Level
B	Shaft		Not Req.			AK-1		Attach to R8A
R9A	500KΩ	½	211-19807			AB-58		Tape Level
B	Shaft		Not Req.			AK-1		Attach to R9A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Webster-Electric PART No.	IRC PART No.	
R10	1Meg	½	29501-57	BTS-1Meg	
R11	100KΩ 5%	½	29501-40	BTS-100K 5%	
R12	100KΩ 5%	½	29501-40	BTS-100K 5%	
R13	3.3Meg	½	29501-121	BTS-3.3Meg	
R14	51KΩ 1%	½	29501-125	DCC-51K 1%	
R15	2000Ω 1%	½	29501-126	DCC-2000 1%	
R16	240KΩ 5%	½	29501-48	BTS-240K 5%	
R17	510KΩ 5%	½	29501-53	BTS-510K 5%	
R18	51KΩ 1%	½	29501-125	DCC-51K 1%	
R19	2000Ω 1%	½	29501-126	DCC-2000 1%	
R20	36KΩ 5%	½	29501-33	BTS-36K 5%	
R21	8200Ω	½	29501-23	BTS-8200	
R22	12KΩ 5%	½	29501-25	BTS-12K 5%	
R23	1Meg	½	29501-57	BTS-1Meg	
R24	22KΩ	½	29501-29	BTS-22K	
R25	22KΩ	½	29501-29	BTS-22K	
R26	2700Ω	½	29501-16	BTS-2700	
R27	510KΩ 5%	½	29501-53	BTS-510K 5%	
R28	51KΩ 5%	½	29501-35	BTS-51K 5%	
R29	1500Ω	½	29501-12	BTS-1500	
R30	510KΩ 5%	½	29501-53	BTS-510K 5%	
R31	100KΩ 5%	½	29501-40	BTS-100K 5%	
R32	2700Ω	½	29501-16	BTS-2700	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Webster-Electric PART No.	IRC PART No.	
R33	100KΩ 5%	½	29501-40	BTS-100K 5%	
R34	100KΩ 5%	½	29501-40	BTS-100K 5%	
R35	470KΩ 5%	½	29501-52	BTS-470K 5%	
R36	1000Ω	½	29501-11	BTS-1000	
R37	100KΩ 5%	½	29501-40	BTS-100K 5%	
R38	10KΩ	1	29501-76	BTA-10K	
R39	2700Ω	½	29501-16	BTS-2700	
R40	100KΩ 5%	½	29501-40	BTS-100K 5%	
R41	100KΩ 5%	½	29501-40	BTS-100K 5%	
R42	470KΩ 5%	½	29501-52	BTS-470K 5%	
R43	51KΩ 5%	½	29501-35	BTS-51K 5%	
R44	2000Ω 5%	½	29501-14	BTS-2000 5%	
R45	1Meg	½	29501-57	BTS-1Meg	
R46	100K Ω 5%	½	29501-40	BTS-100K 5%	
R47	100KΩ 5%	½	29501-40	BTS-100K 5%	
R48	51KΩ 5%	½	29501-35	BTS-51K 5%	
R49A	50KΩ	♦	211-19804	BTS-50K	
B	50KΩ			BTS-50K	
R50	22KΩ	½	29501-29	BTS-22K	
R51	2000Ω 5%	½	29501-14	BTS-2000 5%	
R52	2200Ω	2		BTB-2200	
R53	1000Ω	2	29501-99	BTB-1000	
R54	100KΩ	½	29501-40	BTS-100K	

♦ C39A, C39B, C39C, C39D, R49A, R49B are included in part #211-19804.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	Webster-Electric PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @.26A	570VCT .018A	6.3VAC @.6A	12VAC .600ADC	212-19764					

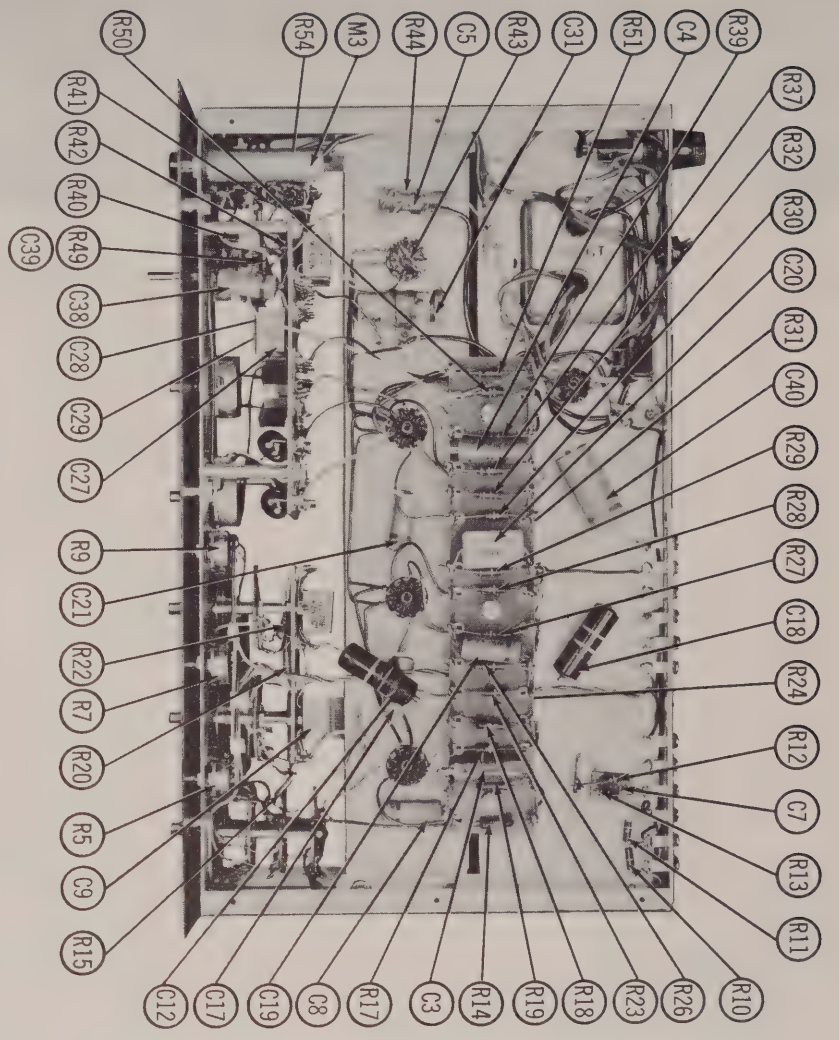
SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	Webster-Electric PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.600ADC	211-19824	1017	C1B			604B	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Webster-Electric PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	3AG	1A 250V	P8755-5	S4619	312001 (3AG 1A)	342001	AGC 1	HKP

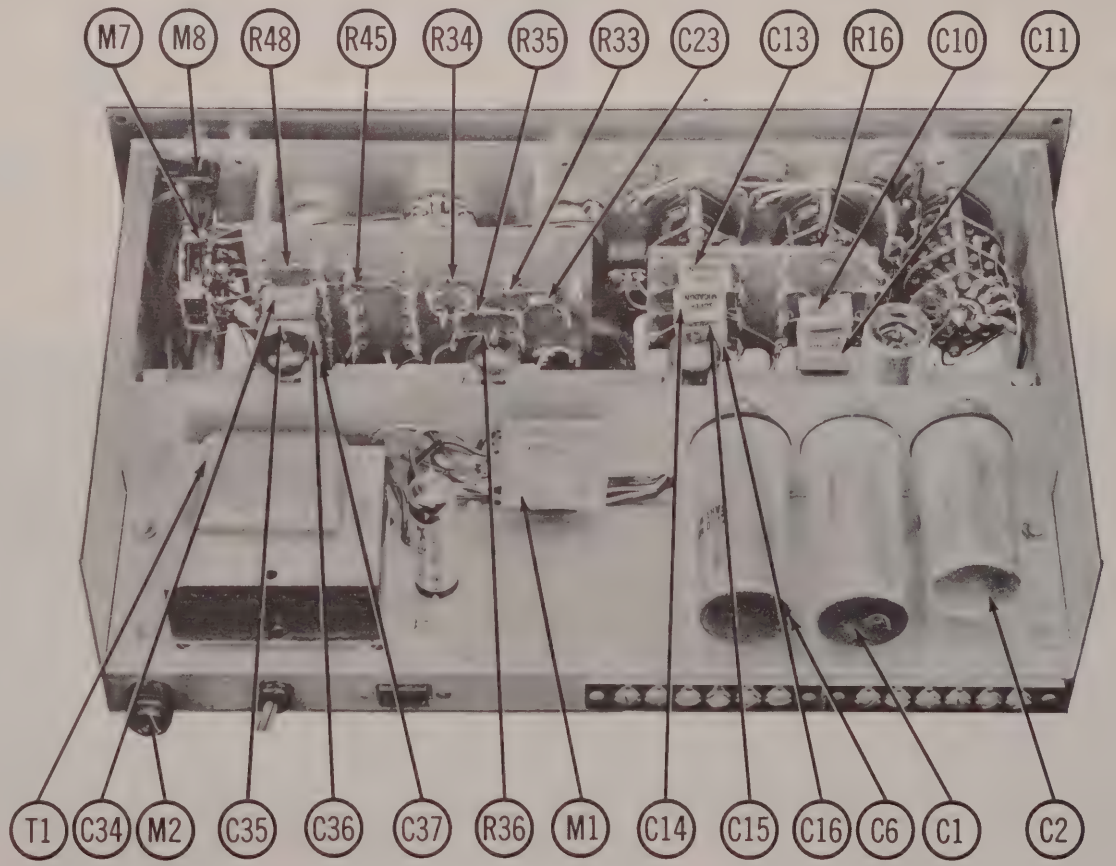
CHASSIS—BOTTOM VIEW



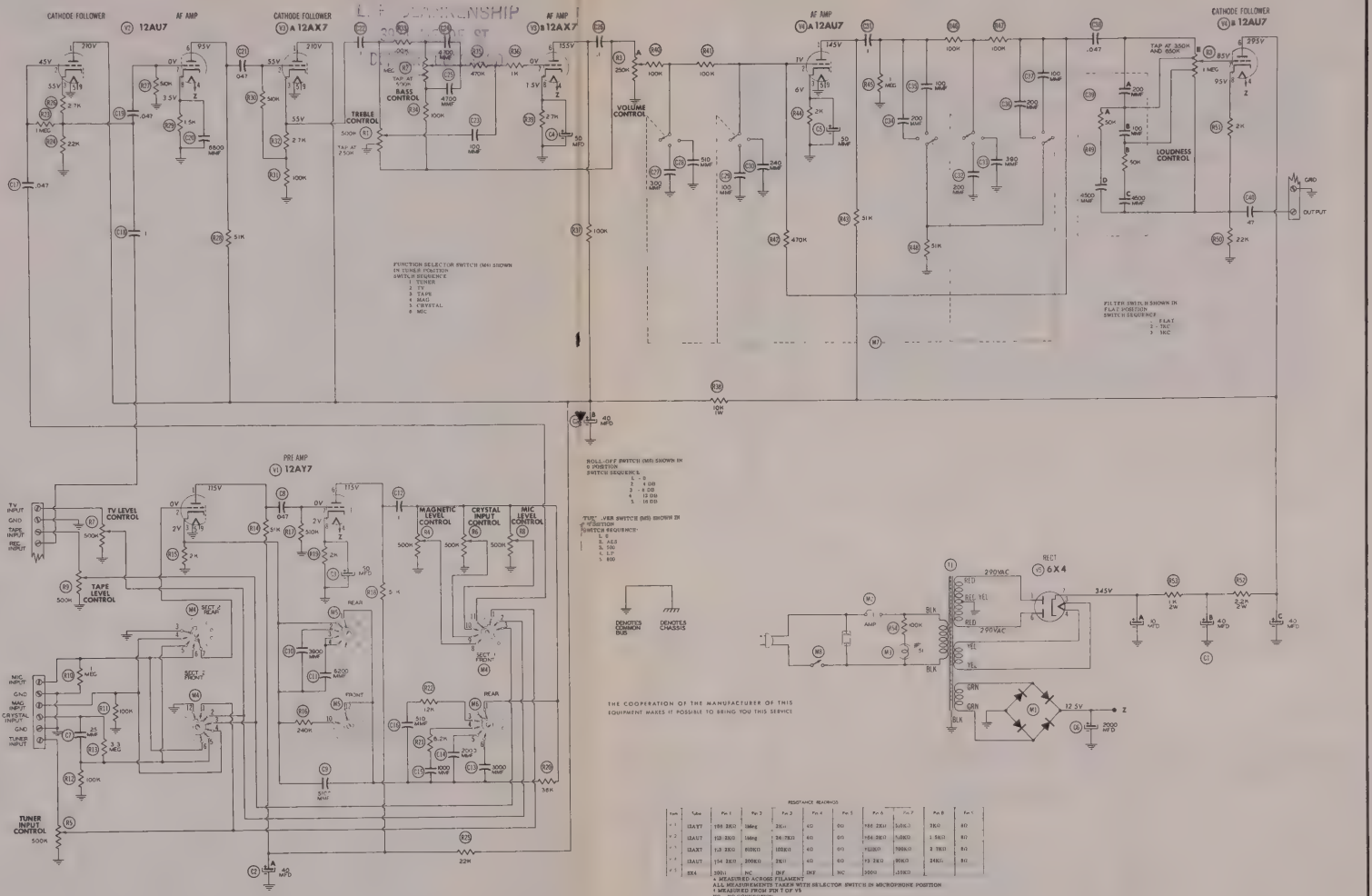
PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	Webster-Electric PART No.	NOTES
M3	Pilot Light		#NE51
M4	Switch	211-19811	Selector (Rotary - wafer type)
M5	Switch	211-19812	Turnover (Rotary - wafer type)
M6	Switch	211-19813	Roll-off (Rotary - wafer type) Part #212-20269 includes terminal board assy. with M5 and M6
M7	Switch	211-19810	Filter (5 Pole - 3 position)
M8	Switch	211-19808	(Power (On-Off)



CHASSIS-TOP VIEW



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
* 1	12AY7	198.2KΩ	146meg	2KΩ	4Ω	0Ω	198.2KΩ	5.6KΩ	3KΩ	4Ω
* 2	12AU7	152.2KΩ	146meg	34.7KΩ	4Ω	0Ω	164.2KΩ	5.6KΩ	1.5KΩ	4Ω
* 3	12AX7	1.2 MEG	810KΩ	103KΩ	4Ω	0Ω	910KΩ	900KΩ	2.7KΩ	4Ω
* 4	12AU7	154.2KΩ	200KΩ	2KΩ	4Ω	0Ω	93.2KΩ	90KΩ	24KΩ	4Ω
* 5	5X4	100Ω	NC	INF	INF	NC	100Ω	35KΩ		

* MEASURED ACROSS FILAMENT
ALL MEASUREMENTS TAKEN WITH SELECTOR SWITCH IN MICROPHONE POSITION
† MEASURED FROM PIN 7 OF V5
NC - NO CONNECTION

1 DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt
2 Socket connections are shown as bottom views
3 Measured values are from socket pin to common negative.
4 Line voltage maintained at 117 volts for voltage readings
5 Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings
6 All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

PHOTOFACT* Folder

RETMA MEMBER

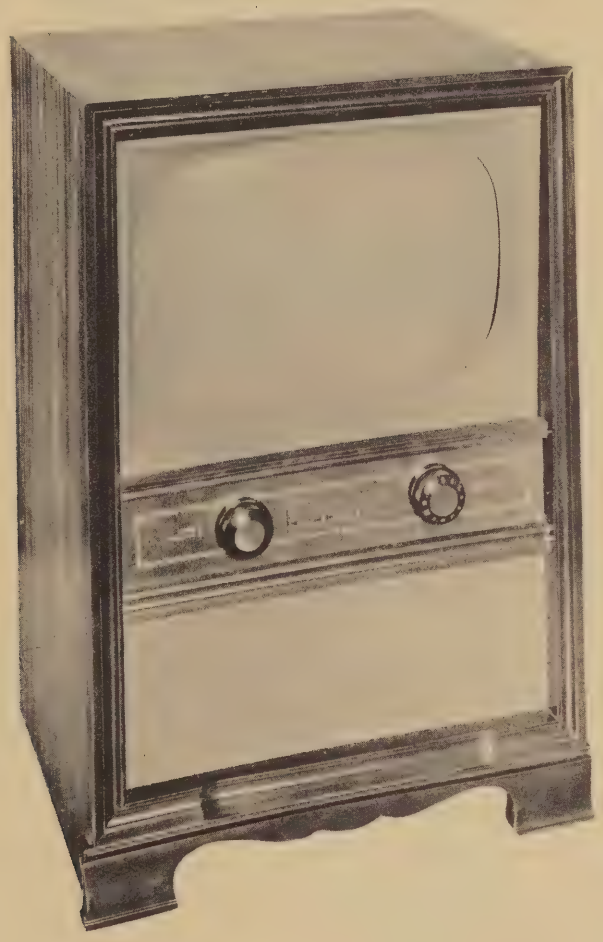
WELLS-GARDNER MODELS
321AM55-A-432-1, 321AM55-A-486-2,
321AM56-A-432-1, 321AM56-A-486-2,
2321AM55-A-488-2, 2321AM56-A-488-2

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

PROPERTY OF
L. F. BLANKENSH
3924 MEADE ST.
DENVER, COLORADO



MODEL 321AM56-A-486-2

WELLS-GARDNER MODELS
321AM55-A-432-1, 321AM55-A-486-2, 321AM56-A-432-1,
321AM56-A-486-2, 2321AM55-A-488-2, 2321AM56-A-488-2

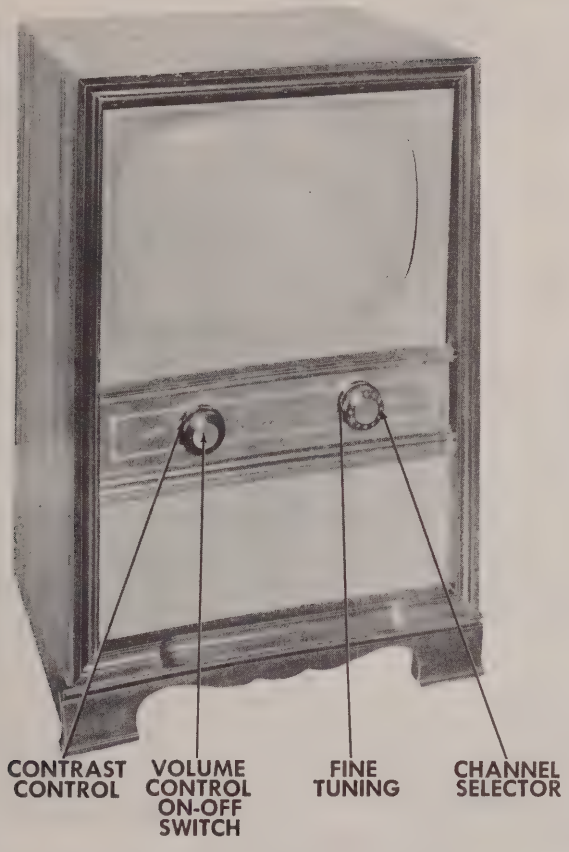
HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 11–55 SET 297 FOLDER 10

PHOTOFACT* Folder
*TRADE MARK

PROPERTY OF
L. F. SUPPLY CO.
3924 MEADE ST.
DENVER, COLORADO



WELLS-GARDNER MODELS
321AM55-A-432-1, 321AM55-A-486-2, 321AM56-A-432-1, 321AM56-A-486-2, 2321AM55-A-488-2, 2321AM56-A-488-2

WELLS-GARDNER MODEL 321AM56-A-486-2

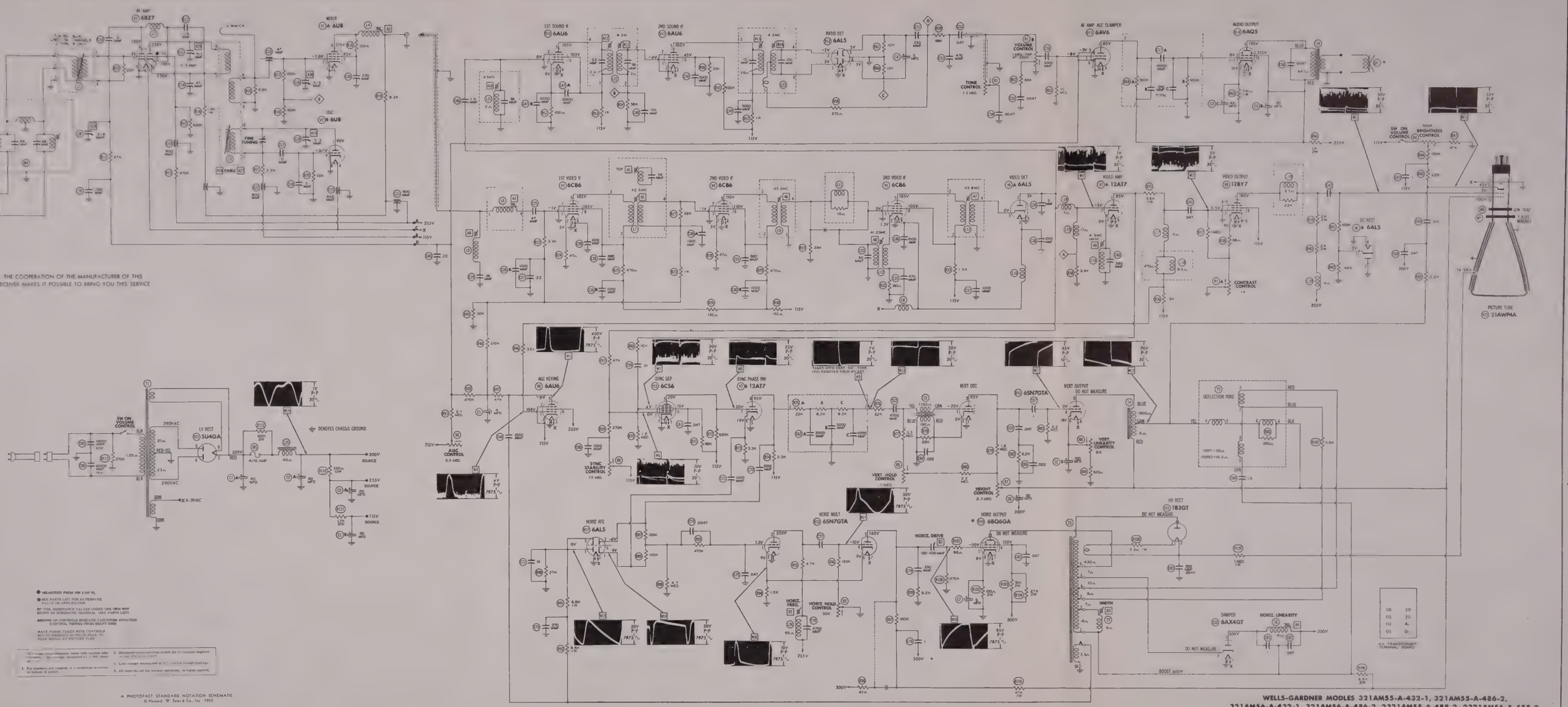
TRADE NAME	Wells-Gardner	MODELS 321AM55-A-432-1, 321AM55-A-486-2, 2321AM55-A-488-2, 321AM56-A-432-1, 321AM56-A-486-2, 2321AM56-A-488-2
MANUFACTURER	Wells-Gardner Co., 2701 N. Kildare Ave., Chicago 39, Illinois	
TYPE SET	Television Receiver	
TUBES	Twenty-three	
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING 1.64 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)	

INDEX

Alignment Instructions 6, 7
Disassembly Instructions 18
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions ..... 13 thru 16
Photographs
Cabinet-Rear View 11
Capacitor Identification 4, 9
Chassis-Top View 3
RF Tuner 10
Resistor Identification 19, 20
Photographs (Cont)
Trans., Inductor & Alignment Identification 17
Resistance Measurements 8
Servicing in the Field 18
Schematic (Alternate Tuner) 10
Schematic (TV) 2
Trouble Shooting Aids 12, 17
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

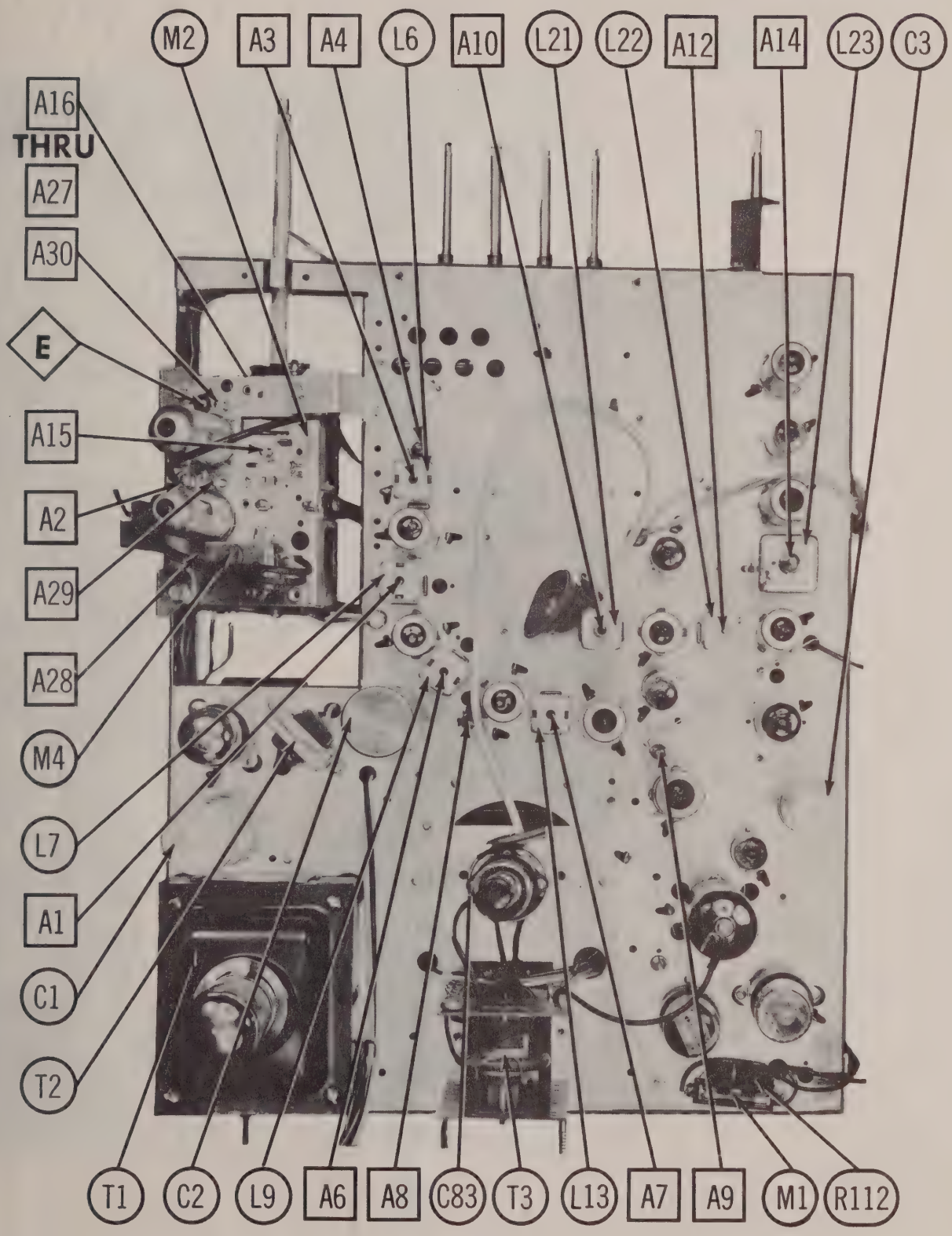
HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America


THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
DENOTES CHASSIS GROUND
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W Sams & Co, Inc 1955
WELLS-GARDNER MODLES 321AM55-A-432-1, 321AM55-A-486-2, 321AM56-A-432-1, 321AM56-A-486-2, 2321AM55-A-488-2, 2321AM56-A-488-2

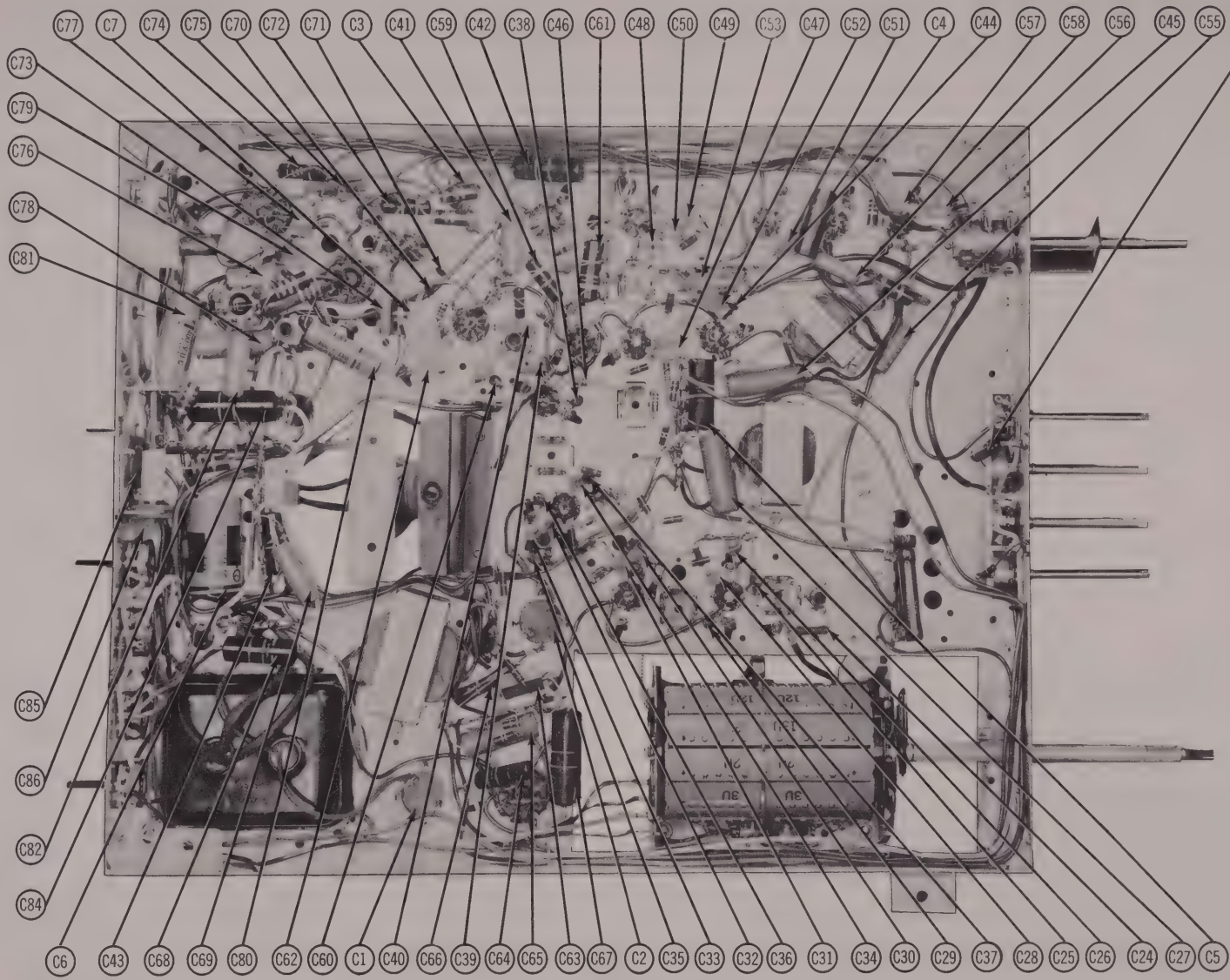
WELLS-GARDNER MODLES 321AM55-A-432-1, 321AM55-A-486-2, 321AM56-A-432-1, 321AM56-A-486-2, 2321AM55-A-488-2, 2321AM56-A-488-2

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



CHASSIS TOP VIEW

SET 297 FOLDER 10

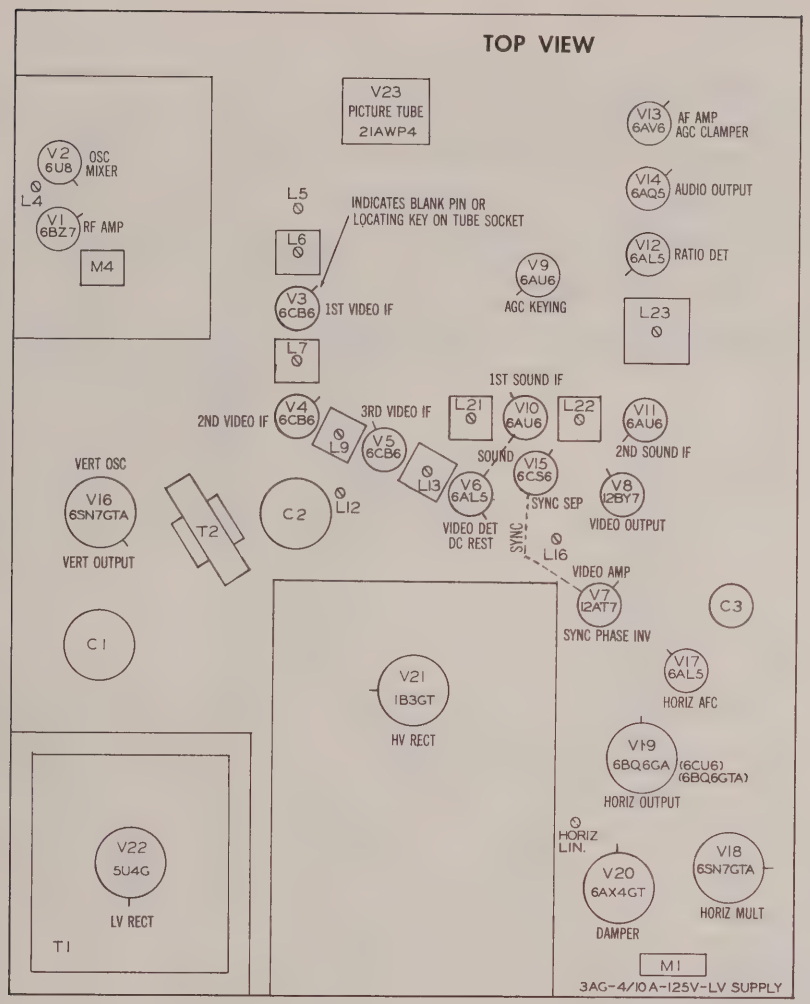


PROPERTY OF
L. F. BLACKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V22, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V8, V9, V23
Has pic, no sound - V10, V11, V12, V13, V14
Overloaded picture - V9, V13

SYNC FAILURE
No vert. sync - V7, V16
No horiz. sync - V7, V17, V18
No vert. or horiz. sync - 7, V15

SWEEP FAILURE
No raster, has sound - V18, V19, V20, V21, V23
No vertical deflection - V16
Poor vert. linearity or foldover - V16
Poor horiz. linearity or foldover - V18, V19, V20
Narrow picture - V18, V19, V20, V21, V22
Vert. off freq. - V7, V16
Horiz. off freq. - V7, V17, V18

WELLS-GARDNER MODLES 321AM55-A-432-1, 321AM55-A-486-2, 321AM56-A-432-1, 321AM56-A-486-2, 2321AM55-A-488-2, 2321AM56-A-488-2

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from chassis.

VIDEO IF ALIGNMENT

Connect the negative lead of a 1.5V battery to the ungrounded side of C27. Connect the positive lead to chassis.
Remove the converter tube (V2) from its socket and replace with a 6U8 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
An alternate method of disabling the local oscillator is to place a piece of transparent tape on the first two contacts (from front of drum assembly) of any channel and then switch to the insulated strip.
Use only enough generator output to produce usable indication on scope or VTVM.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	44MC (10MC Swp)	41.25MC 45.75MC 47.25MC	Any	Vert. Amp. thru detector (Fig.1) to pin 5 of 6CB6 (V3). Low side to chassis.	A1, A2, A3, A4	Adjust A1 to place 47.25MC marker in trap notch as in Fig. 3. Adjust A2, A3 and A4 for response similar to Fig. 2. A2 and A3 affect the flat portion of curve. A4 positions the 41.25MC marker. Make sure 45.75MC marker is on peak of curve as shown or 44.5MC marker on overall response will be incorrect.
2.	"	"	Not used	42.5MC (Unmod)	"	Used VTVM. DC probe to point (A). Common to chassis	A5	Increase bias from 1.5 volts to 4.5 volts at ungrounded side of C27. Attenuate generator output to maintain 1 volt at VTVM. Adjust for maximum deflection.
3.	"	"	"	45.3MC (Unmod)	"	"	A6	"
4.	"	"	"	43.9MC (Unmod)	"	"	A7	"
5.	"	"	"	41.25MC (Unmod)	"	"	A8	"
6.	"	"	44MC (10MC Swp)	41.25MC 42.25MC 42.5MC 43.9MC 44.5MC 45.3MC 45.75MC 47.25MC	"	Vert. Amp. thru 10KΩ to point A. Low side to chassis.		Check for response curve similar to Fig.3. SLIGHTLY retouch A5 thru A8 to obtain desired response. If A1 thru A4 requires retouching, step 1 should be repeated.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	10KΩ	High side thru 10KΩ to pin 2 (plate) of 6AL5 (V6A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to pin 2 (grid) of picture tube. Common to chassis.	A9	Adjust for MINIMUM deflection.

ALTERNATE 4.5MC TRAP ALIGNMENT

Remove the dummy converter tube and replace the original 6U8 in its socket or remove cellulose tape from tuner strip.
Remove bias supply.
Tune in a TV station and adjust A9 for minimum 4.5MC beat interference in picture.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Remove 6CB6 (V5) from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	10KΩ	High side thru 10KΩ to pin 2 (plate) of 6AL5 (V6A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point (B). Common to chassis.	A10, A11, A12	Adjust for maximum deflection.
9.	"	"	"	"	DC probe to point (C). Common to chassis.	A13	Use only enough signal generator output to provide usable indication on VTVM. Adjust for maximum deflection.
10.	"	"	"	"	DC probe to point (D). Common to chassis.	A14	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Replace V5 in its socket.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Remove 6CB6 (V5) from its socket.
Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	10KΩ	High side thru 10KΩ to pin 2 (Plate) of 6AL5 (V6A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point (B). Low side to chassis.	A10, A11, A12,	Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
9.	"	"	"	"	"	Vert. Amp. to point (C). Low side to chassis.	A13	Disconnect stabilizing capacitor C4. Use only enough sweep generator output to provide usable indication on scope. Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
10.	"	"	"	"	"	Vert. Amp. to point (D). Low side to chassis.	A14	Reconnect stabilizing capacitor C4. Adjust so that 4.5MC occurs at center of cross-over lines as in Fig. 5. SLIGHTLY retouch A13 for maximum amplitude and straightness of crossover lines.

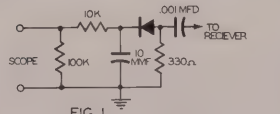


FIG. 1

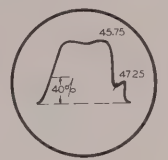


FIG. 2

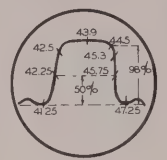


FIG. 3

FIG. 4

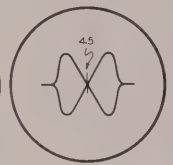


FIG. 5

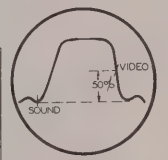


FIG. 6

FIG. 7

VHF OSCILLATOR ALIGNMENT

Connect the negative lead of a 4.5 volt battery to the ungrounded side of C27.
Connect positive lead to chassis.
Complete oscillator alignment may not be necessary. If the oscillator seems to be off frequency the same amount for a majority of the channels it may be possible to correct them in one step using A15 adjustment. It should be noted that this is an all channel oscillator circuit adjustment, and should not be used to correct any individual channel. If adjustment of A15 will not bring all channels well within range of the fine tuning control it will be necessary to adjust the channel strip adjustment screw for each channel that is off frequency.
The channel oscillator adjustment screws are reached thru a hole just to the left of the channel switch shaft.
The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel.
Remove the dummy converter tube and replace original 6U8 in its socket or remove cellulose tape from tuner strip.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A16	Adjust to place sound marker in trap notch as in Fig. 8. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A17	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A18	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A19	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A20	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A21	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A22	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A23	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A24	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A25	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A26	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A27	

VHF RF AND MIXER ALIGNMENT

Connect the negative lead of a 3 volt bias supply to the ungrounded side of C45. Connect positive lead to chassis ground.
Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A28, A29, A30	Adjust for response curve similar to Fig.7 with markers above 90%.
13.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		If markers fall below 70% on any channel make compromise adjustment of A28, A29 and A30 with channel switch set to that channel. Then recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

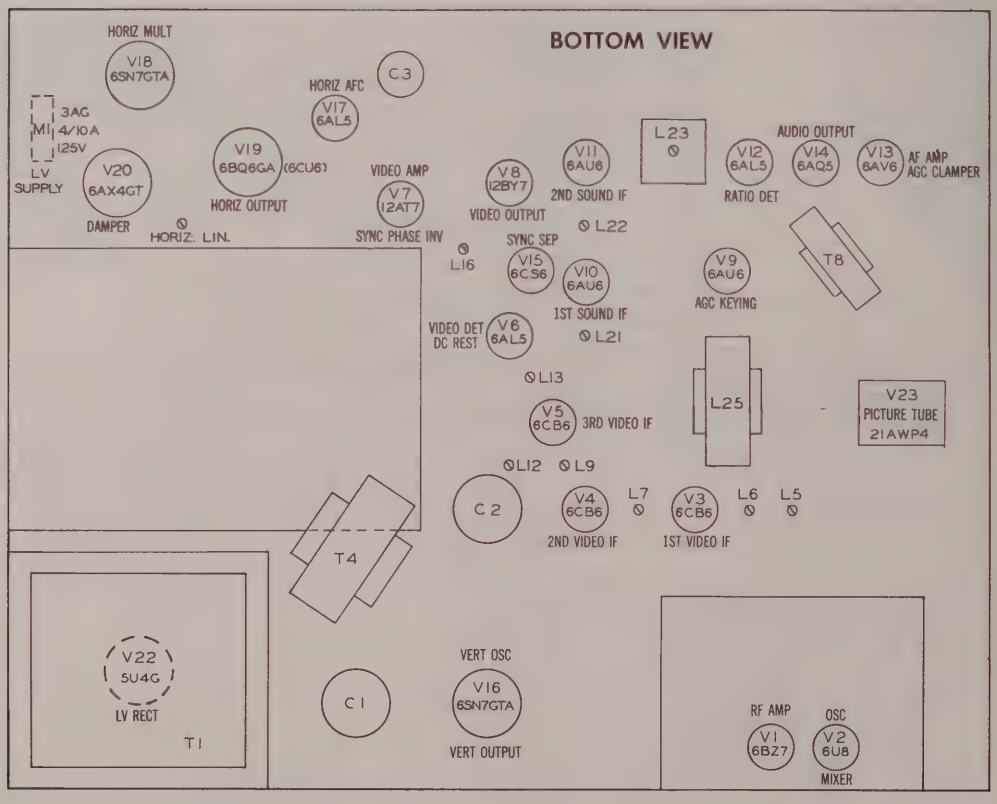
UHF TUNER ALIGNMENT

This portion of the set has been properly aligned at the factory.
Alignment of this portion is not recommended in the field.

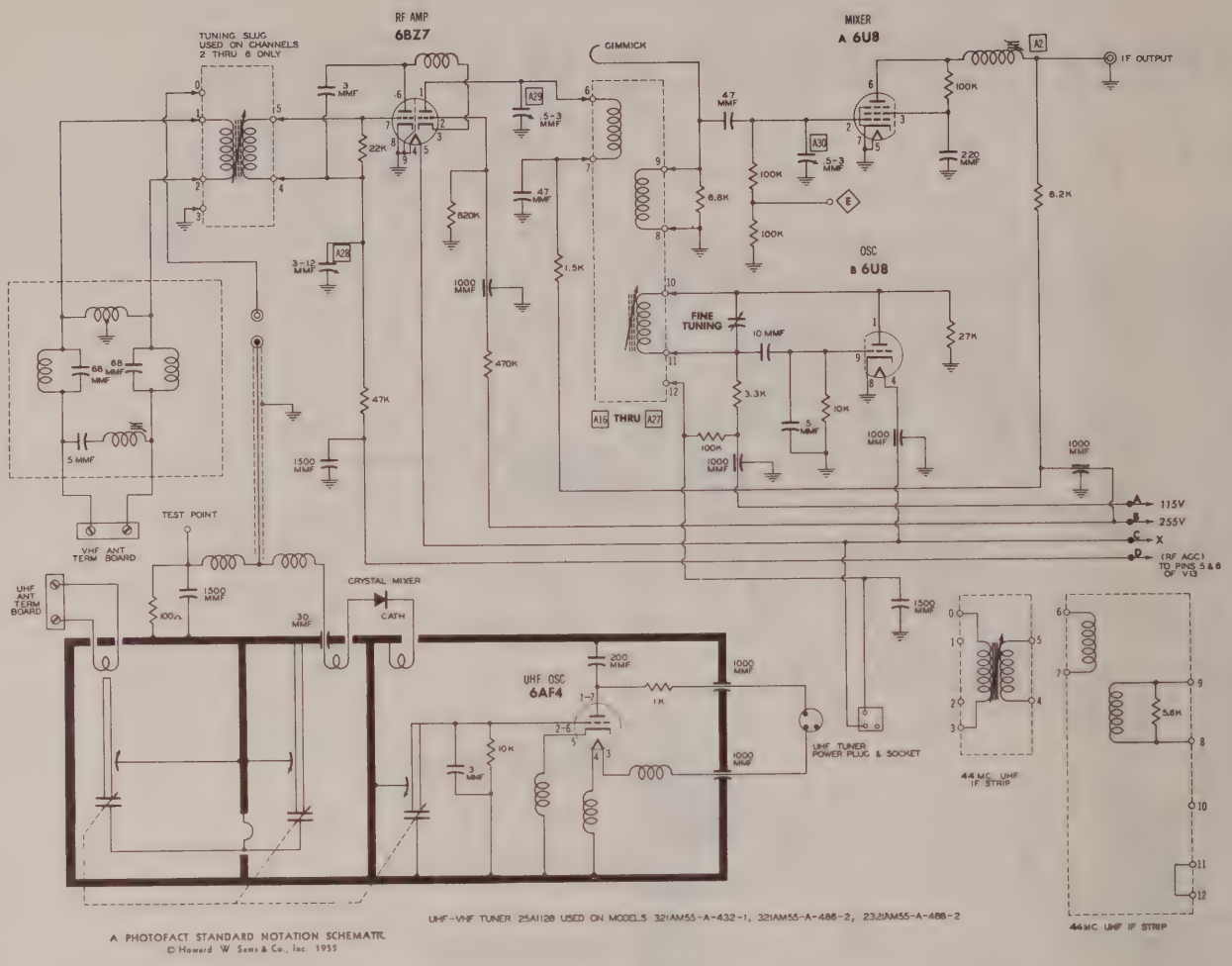
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	†1.8KΩ	300KΩ	INF	0Ω	.1Ω	INF	1Meg	0Ω	†1.8KΩ
V 2	6U8	†5.3KΩ	200KΩ	†100KΩ	.1Ω	0Ω	†8.2KΩ	0Ω	0Ω	10KΩ
V 3	6CB6	100KΩ	47Ω	0Ω	.1Ω	†2.8KΩ	†2.8KΩ	0Ω		
V 4	6CB6	100KΩ	47Ω	0Ω	.1Ω	†2.7KΩ	†2.7KΩ	0Ω		
V 5	6CB6	.1Ω	180Ω	0Ω	.1Ω	†3.5KΩ	†3.5KΩ	0Ω		
V 6	6AL5	1Meg	3.9KΩ	.1Ω	0Ω	.4Ω	0Ω	0Ω		
V 7	12AT7	†9KΩ	3.9KΩ	.2Ω	0Ω	0Ω	†5.3KΩ	†820KΩ	3.3KΩ	.1Ω
V 8	12BY7	450Ω	1Meg	0Ω	.1Ω	.1Ω	0Ω	†4KΩ	†2.1KΩ	0Ω
V 9	6AU6	†36KΩ	†2.1KΩ	.1Ω	0Ω	500KΩ	†400Ω	†2.1KΩ		
V 10	6AU6	2Ω	0Ω	0Ω	.1Ω	†3KΩ	†3KΩ	100Ω		
V 11	6AU6	56KΩ	0Ω	.1Ω	0Ω	†3KΩ	†30KΩ	0Ω		
V 12	6AL5	INF	INF	.1Ω	0Ω	10KΩ	0Ω	10KΩ		
V 13	6AV6	10Meg	0Ω	.1Ω	0Ω	850KΩ	850KΩ	†500KΩ		
V 14	6AQ5	500KΩ	330Ω	0Ω	.1Ω	†2KΩ	†1.4KΩ	500KΩ		
V 15	6CS6	50KΩ	0Ω	.1Ω	0Ω	†820KΩ	†68KΩ	1.5Meg		
V 16	6SN7GTA	4Meg	▲2.5Meg	190Ω	2.2Meg	▲8.5KΩ	2KΩ	0Ω	.1Ω	
V 17	6AL5	4.8Meg	4.8Meg	.1Ω	0Ω	10KΩ	NC	10KΩ		
V 18	6SN7GTA	5Meg	†5KΩ	1.5KΩ	160KΩ	†230KΩ	1.5KΩ	.1Ω	0Ω	
V 19	6BQ6GA	TP	0Ω	TP	†15KΩ	470KΩ	TP	.1Ω	100Ω	Top Cap ▲17Ω
V 20	6AX4GT	TP	NC	150KΩ	TP	†65Ω	NC	.1Ω	0Ω	
V 21	1B3GT		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			Top Cap ▲450Ω
V 22	5U4GA	INF	50KΩ	INF	23Ω	INF	21Ω	INF	50KΩ	
V 23	21AWP4	0Ω	1Meg	Pin 10 ▲6.8KΩ	Pin 11 †250KΩ	Pin 12 .1Ω				

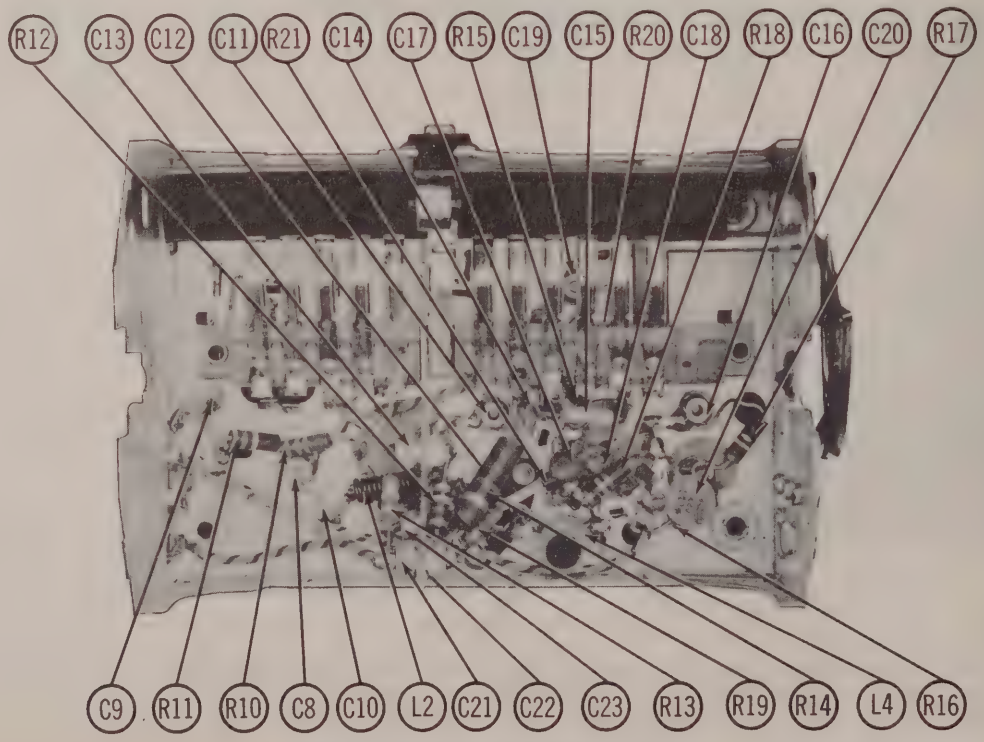
† MEASURED FROM PIN 2 OF V22.
▲ MEASURED FROM PIN 3 OF V20.
TP - TIE POINT
NC - NO CONNECTION



TUBE PLACEMENT CHART

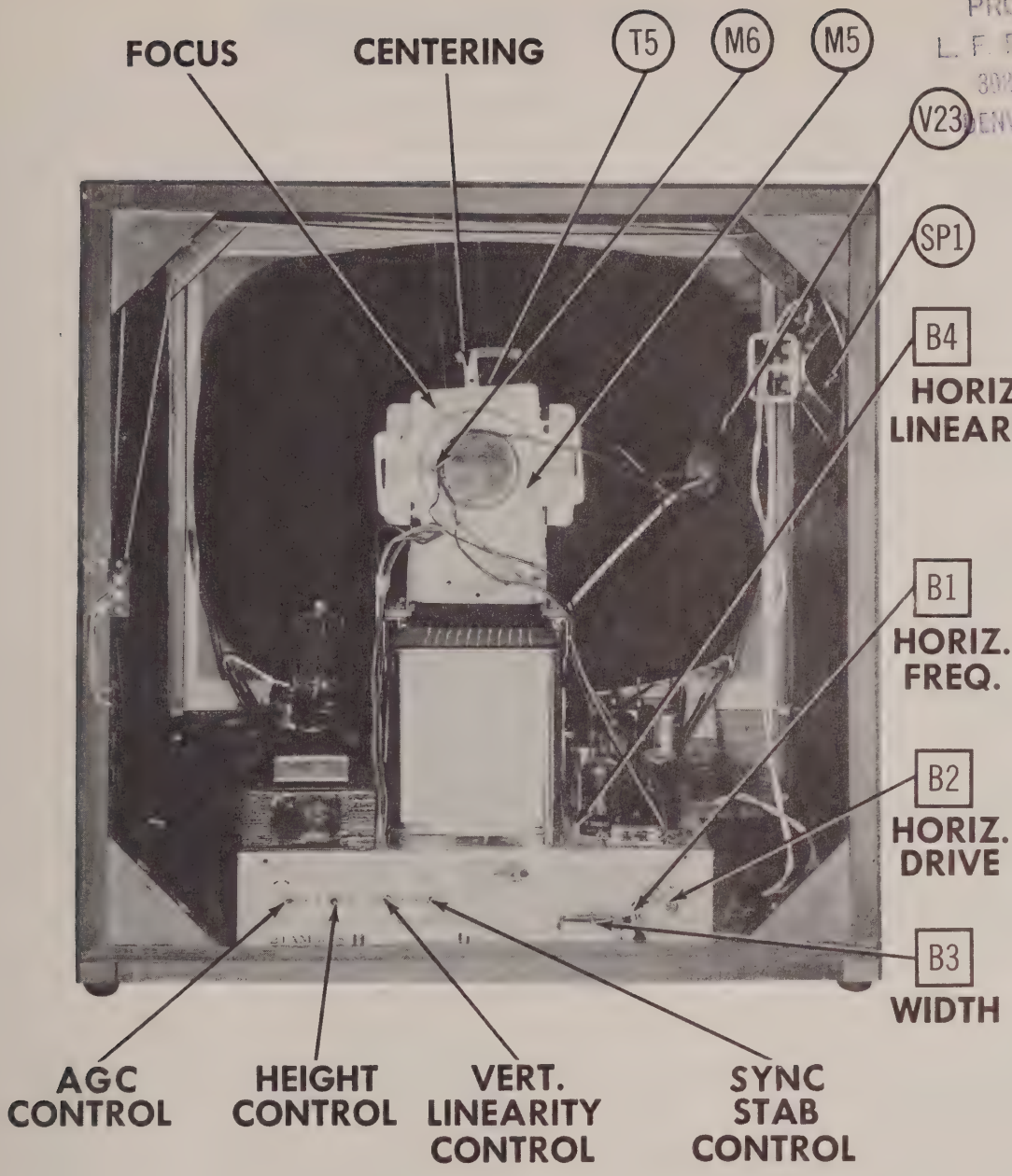


ALTERNATE TUNER SCHEMATIC



RF TUNER-BOTTOM VIEW

PROPERTY OF
L. F. BLANKENSHIP
3004 MEADE ST.
DENVER, COLORADO



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station preferably a test pattern.

IF horizontal hold control fails to maintain sync, set it in the middle of its range and adjust the horizontal frequency slug (B1) until the picture is in sync. Check other channels and if necessary readjust B1 slightly for best sync on all channels. With picture locked in sync turn contrast control to minimum contrast and adjust brightness control for a washed out picture. Adjust the width control (B3) for a picture slightly wider than necessary to fill the mask horizontally.

Turn the horizontal drive timmer (B2) inward (if necessary) until horizontal drive line disappears.

Adjust the horizontal linearity control (B4) for a picture that is symmetrical from left to right.

Adjust the picture centering device located in front of focus magnet to center picture in the mask.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss Of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V19, V20 and V22. Check adjustments B2, B3 and B4. Check T3, T5A, R103, R104, R99, C79, C7 and other associated components.

DRIVE LINES

Check by substitution V19 and V20. Check adjustments B2 and B4. Check R103, R104 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V19 and V20. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V18, V19 and V20. Check C75 for open. Check L24, C76, R94 and other associated components.

XMAS TREE EFFECT

Check by substitution V18, V19 and V20. Check T3 and T5 for internal arcing. Check C72, C74, C76, C77, L24, R90, R95 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V16. Check waveform W11.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R8, R84 and other associated components.	Check T2, R77, R79, R106, R7, C64, C67 and other associated components.

INSUFFICIENT SWEEP

Substitute V16. Check height and vertical linearity controls for proper operation. Check R79, T4 and other associated components.

COMPRESSED AT BOTTOM

Substitute V16. Check R79, R80, R106, R7, C67 and other associated components.

COMPRESSED AT TOP

Substitute V16. Check R8, R84, C2B, C67, T4 and other associated components.

FOLDS

Substitute V16. Check C65, C66, C67, R82, T4, T5B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V15 and V7. Check C59, C61, R71, R72, R74 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V16. Check vertical integrator network. Check C63, C64, R78, R77, R5, T2 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V17 and V18. Check C70, C71, C76, L24, R95 and other associated components.

HORIZONTAL BENDING

Check by substitution V7, V15, V17 and V18. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Check by substitution V7 and V8. Check R35, R36, R39, R40, C41, C42, L20, L17 and other associated components.

SOUND BARS(4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A9. Check Video IF Alignment.

POOR CONTRAST

Check by substitution V7 and V8. Check contrast control. Check L18, L19, C41, C42 and other associated components.

NEGATIVE PICTURE

Check by substitution V7 and V8. Check picture tube. Check C41, C42, R38 and other associated components.

SMEAR

Check by substitution V7 and V8. Check L14, L15, L18, L19, C41, C42 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6, V7 and V8 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V10, V11, V12, V13 and V14. Check stages V13 and V14 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C53, C56, C57, C58, C3B, C3C, R66, R65, R64, T8, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A14 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak Or No Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, substitute V22. Check M1 fuse. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V22. Check B+ filter and decoupling network.

PROPERTY OF
L. F. CLAWSENSHIP
3824 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Wells-Gardner PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BZ7	6BZ7	9AJ	
V2	Mixer-Osc.	6U8	6U8	9AE	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Det. - DC Restorer	6AL5	6AL5	6BT	
V7	Video Amp. - Sync Phase Inv.	12AT7	12AT7	9A	
V8	Video Output	12BY7	12BY7	9BF	
V9	AGC Keying	6AU6	6AU6	7BK	
V10	1st. Sound IF Amp.	6AU6	6AU6	7BK	
V11	2nd. Sound IF Amp.	6AU6	6AU6	7BK	
V12	Ratio Det.	6AL5	6AL5	6BT	
V13	AF Amplifier - AGC Clamper	6AV6	6AV6	7BT	
V14	Audio Output	6AQ5	6AQ5	7BZ	
V15	Sync Separator	6CS6	6CS6	7CH	
V16	Vert. Oscillator - Vert. Output	6SN7GTA	6SN7GTA	8BD	
V17	Horiz. AFC	6AL5	6AL5	6BT	
V18	Horiz. Mult.	6SN7GTA	6SN7GTA	8BD	
V19	Horiz. Output	6BQ6GA	6BQ6GA	6AM	6CU6, 6BQ6TA used as alternate
V20	Damper	6AX4GT	6AX4GT	4CG	
V21	HV Rectifier	1B3GT	1B3GT	3C	
V22	LV Rectifier	5U4GA	5U4GA	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	Wells-Gardner PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V23	21AWP4 ①	21AWP4 ①	21AWP4 ①	21AWP4 ②	21AWP4 ①	12N	① Aluminized ② Silver Screen

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	Wells-Gardner PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▬80	400	45X390	FP229.4	TM-D80-450	T-180	
B	▲60	400					
C2A	▬80	400	45X391	FP229.8	TM-3057	T-720	
B	▲100	50					
C3A	■20	400	45X392	FP234	TM-D20-450	D-215	
B	▲20	400		TC39	TD-50-50	FM-0550	
C	40	50					
C4	5	25		TC30	TD-5-25	MMT-0505	
C5	4	100	45X361	TC40	TD-4-150	FM-1504	
C6	30	400		TC77	TD-30-450	FM-4530	
C7	5	25		TC30	TD-5-25	MMT-0505	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	Wells-Gardner PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C8	3-9		31A-079	829-10			
C9	1500			DD-152	801-0015	DC-5215	
C10	3		13L-8C030K	TCZ-3R3	NP0A-030	ZT-5533	
C11	.5-3		31A-056-1	829-3	3115-01-0R5	CT565A	
C12	1.5		13L-8C1R5C	TCZ-1R5	NP0A-1R5	ZT-5515	
C13	800						
C14	47		13L-8Q470K	DD-470	831-470	UC-5447	
C15	47		13M-20U470K-R	MFT-50			
C16	.5-3		31A-056-1	829-3	3115-01-0R5	CT565A	
C17	10		13L-8T100A	TCN-10	N750K-100	NT-541	
C18	5		13L-8UA050C				
C19	.5-3		31A-056-1	829-3	3115-01-0R5	CT565A	
C20	220		13L-12D221K	DD-221	811-221	UC-5322	
C21	800						
C22	800						
C23	800						
C24	36		47X626				
C25	47			D6-470	GP1K-470	UC-5447	
C26A	1000			DD2-102	812-001	DCD-521	
B	1000						
C27	.22	200	RCP10M2224M			PT4022	
C28	680			DD-681	811-681	UC-5368	
C29	1000			DD-102	801-001	DC-521	
C30A	1000			DD2-102	812-001	DCD-521	
B	1000						
C31	680			DD-681	811-681	UC-5368	
C32	1.5			TCZ-1R5	NP0A-1R5	ZT-5515	
C33	150	500	RCM15E151K	D6-151	811-151	MCB236	
C34	680			DD-681	811-681	UC-5368	
C35	470		80X4	DD-471	831-471	UC-5347	
C36	1000			DD-102	801-001	DC-521	
C37	1000			DD-102	801-001	DC-521	
C38	1000			DD-102	801-001	DC-521	
C39	5		47X562	TCZ-4R7	NP0A-050	ZT-555	
C40	360	500	47X568		811-361		
C41	.047	400		DF-503		PT4147	
C42	.1	400		DF-104		PT401	
C43	.1	200		DF-104		PT401	
C44	1000			DD-102	801-001	DC-521	
C45	.22	200	RCP10M2224M			PT4022	
C46	1.5			TCZ-1R5	NP0A-1R5	ZT-5515	
C47A	10000		80X6	DD3-103	811-01	DC-511	
B	10000				811-01	DC-511	
C48	100			D6-101	GP1K-101	UC-531	

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	CAP	VOLT	Wells-Gardner PART No	CENTRALAB PART No	ERIE PART No	MALLORY PART No	NOTES
C49	5000			DD-502	811-005	DC-525	
C50	5000			DD-502	811-005	DC-525	
C51	330	500	47X570	DS-331	811-331	UC-5333	
C52	470	500	47X338	DS-471	GP3K-471	MC245	
C53	.047	200		DF-503		PT4147	
C54	.0047	400		DS-472	GP2-333-472	PT6247	
C55	.0047	400		DS-472	GP2-333-472	PT6347	
C56	5000			DD-502	811-005	DC-525	
C57A	10000						
B	350		†76X5	†PC-80	†1404-01		
C							
C58	.0047	500		DS-472	GP2-333-472	PT6247	
C59	.01	400		DS-103	GP2-333-103	PT411	
C60	1000			DD-102	801-001	DC-521	
C61	.047	400		DF-503		PT4147	
C62A	3000					DC-522	
B	5000		*76X7	*PC-100	*1405-01	DC-525	
C	5000					DC-525	
C63	4700	500	47X543			MCB465	
C64	.022	200		DF-203	817-02	PT4122	
C65	.047	600		DF-503		PT6147	
C66	.022	200		DF-203	817-02	PT4122	
C67	.1	600		DF-104		PT601	
C68	.047	600		DF-503		PT6147	
C69	.015	600	RCP10M6153M	DD18-153		PT615	
C70	1000			DD-102	801-001	DC-521	
C71	1000			DD-102	801-001	DC-521	
C72	.01	400		DS-103	GP2-333-103	PT411	
C73	270	500		DS-271	811-271	MC241	
C74	.0047	400		DS-472	GP2-333-472	PT6347	
C75	.047	200		DF-503		PT4147	
C76	4700	500	47X543			MCB465	
C77	390	500	RCM30B391J	DS-391	811-391	MC5243	
C78	.1	400		DF-104		PT401	
C79	330	500	47X570	DS-331	811-331		
C80	.047	400		DF-503		PT4147	
C81	.1	400		DF-104		PT401	
C82	.047	400		DF-503		PT4147	
C83	500	20000	47X560	TV3-502	413	RV20035A	
C84	.15	400	RCP10M4154M			PT4015	
C85	10000	1000		DD-103			
C86	10000	1000		DD-103			

† Items C57A, C57B, C57C, R64A, R64B are combined in one unit.
When replacing items separately C57B and C57C should total 250MMF.
* Items C62A, C62B, C62C, R57A, R57B and R75C are combined in one unit.

CONTROLS

ITEM No.	RATING		Wells-Gardner PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
	RESISTANCE	WATTS						
R1A	1000Ω	½	B76X61	*Q7-638	RTV-502	F1-4	UF13L	Contrast – Panel
B	1Meg	½				R2-59	UR16-T254	Volume tapped at 250KΩ – Rear
C	Switch					KB-2	US-27	Attach to R1B
R2A	50KΩ	½	B40X361-C	Q11-123	A47-50K-S	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	NQ	RS-3/16	AK-4	Not Req.	Attach to R2A
R3A	1.5Meg	½	B40X334-E	Q11-138	A47-1.5Meg-S	AB-75	U-156	Tone
B	Shaft		Not Req.	NQ	RS-3/16	AK-4	Not Req.	Attach to R3A
R4A	500KΩ	½	B40X333-A	Q11-133	A47-500K-S	AB-59	U-50	Brightness
B	Shaft		Not Req.	NQ	RS-3/16	AK-8	Not Req.	Attach to R4A
R5A	1.5Meg	½	B40X334-E	Q11-138	A47-1.5Meg-S	AB-75	U-156	Vert. Hold
B	Shaft		Not Req.	NQ	RS-3/16	AK-4	Not Req.	Attach to R5A
R6A	2.5Meg	½	B40X369-A	Q11-239	A47-2.5Meg-S	AB-83	SU-565	AGC
B	Shaft		Not Req.	NQ	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7A	2.5Meg	½	B40X369-A	Q11-239	A47-2.5Meg-S	AB-83	SU-565	Height
B	Shaft		Not Req.	NQ	FKS-1/4	AK-1	Not Req.	Attach to R7A
R8A	800Ω	½	B40X375	Q11-116	A47-10K-S	AB-14	SU-20	Vert. Linearity
B	Shaft		Not Req.	NQ	FKS-1/4	AK-1	Not Req.	Attach to R8A
R9A	7.5Meg	½	B40X370-A	Q11-142	A47-7.5Meg-S	AB-89	U-82	Sync Stability
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-4	Not Req.	Attach to R9A

* CONCENTRIKIT EQUIVALENT: KIT K-4, BASE ELEMENTS & SHAFTS: SII-108 & P6-218 (PANEL)
B18-157X & R16-313 (REAR)
76-2 SWITCH

RESISTORS

ITEM No.	RATING		Wells-Gardner PART No.	IRC PART No.	NOTES
	OHMS	WATT			
R10	22KΩ	½	12T-AE223K	BTS-22K	
R11	47KΩ	½	12T-AE473M	BTS-47K	
R12	820KΩ	½	12T-AE824T	BTS-820K	
R13	470KΩ	½	12T-AE474K	BTS-470K	
R14	1500Ω	1	12S-AE152K	BTA-1500	
R15	6800Ω	½	12T-AE682K	BTS-6800	
R16	100KΩ	½	12T-AE104K	BTS-100K	
R17	100KΩ	½	12T-AE104K	BTS-100K	
R18	100KΩ	½	12T-AE104K	BTS-100K	
R19	8200Ω 5%	½	12T-AE822K	BTS-8200 5%	
R20	10KΩ	½	12T-AE103M	BTS-10K	
R21	3300Ω	½		BTS-3300	
R22	3300Ω 5%	½		BTS-3300 5%	
R23	1000Ω	½		BTS-1000	
R24	470 5%	½		BTS-47 5%	
R25	470Ω	½		BTS-470	
R26	150Ω	½		BTS-150	
R27	39KΩ 5%	½		BTS-39K 5%	
R28	47Ω 5%	½		BTS-47 5%	
R29	470Ω	½		BTS-470	
R30	150Ω	½		BTS-150	
R31	39KΩ 5%	½		BTS-39K 5%	
R32	180Ω	½		BTS-180	
R33	1500Ω	½		BTS-1500	
R34	3900Ω	½		BTS-3900	
R35	5600Ω	½		BTA-5600	
R36	1500Ω	½		BTS-1500	
R37	1Meg	½		BTS-1Meg	

ITEM No.	RATING		Wells-Gardner PART No.	IRC PART No.	NOTES
	OHMS	WATT			
R38	68Ω	½		BTS-68	
R39	2000Ω 5%	2	D83202	BTS-2000 5%	
R40	2000Ω 5%	2	D83202	BTB-2000 5%	
R41	100KΩ	½		BTS-100K	
R42	1Meg	½		BTS-1Meg	
R43	47KΩ	½		BTS-47K	
R44	100KΩ	½		BTS-100K	
R45	22KΩ	½		BTS-22K	
R46	33KΩ	½		BTS-33K	
R47	47KΩ	½		BTS-47K	
R48	330KΩ 5%	½		BTS-330K 5%	
R49	100KΩ	½		BTS-100K	
R50	470KΩ	½		BTS-470K	
R51	2.7Meg	½		BTS-2.7Meg	
R52	100Ω	½		BTS-100	
R53	1000Ω	½		BTS-1000	
R54	56KΩ	½		BTS-56K	
R55	33KΩ	½		BTS-33K	
R56	33KΩ	½		BTS-33K	
R57	1000Ω	½		BTS-1000	
R58	270Ω	½		BTS-270	
R59	68KΩ	½		BTS-68K	
R60	10KΩ 5%	½		BTS-10K 5%	
R61	10KΩ 5%	½		BTS-10K 5%	
R62	68KΩ	½		BTS-68K	
R63	10Meg	½		BTS-10Meg	
R64A	500KΩ	½		BTS-470K	
B	500KΩ	½	†76X5	BTS-470K	

RESISTORS (cont)

ITEM No.	RATING		Wells-Gardner PART No.	IRC PART No.	NOTES
	OHMS	WATT			
R65	330Ω	1		BTA-330	
R66	1000Ω	2		BTB-1000	
R67	47KΩ	½		BTS-47K	
R68	10KΩ	½		BTS-10K	
R69	270KΩ	½		BTS-270K	
R70	1.5Meg	½		BTS-1.5Meg	
R71	68KΩ	½		BTS-68K	
R72	820KΩ	½		BTS-820K	
R73	3300Ω 5%	½		BTS-3300 5%	
R74	3300Ω 5%	½		BTS-3300 5%	
R75A	22KΩ	½		BTS-22K	
B	8200Ω	½	*76X7	BTS-8200	
C	8200Ω	½		BTS-8200	
R76	22KΩ	½		BTS-22K	
R77	3.3Meg	½		BTS-3.3Meg	
R78	22KΩ	½		BTS-22K	
R79	1.8Meg	½		BTS-1.8Meg	
R80	2.2Meg	½		BTS-2.2Meg	
R81	200KΩ 5%	½		BTS-200K 5%	
R82	8200Ω	½		BTS-8200	
R83	2.2Meg	½		BTS-2.2Meg	
R84	820Ω	½		BTS-820	
R85	2200Ω	½		BTS-2200	
R88	560Ω	½		BTS-560	
R87	100KΩ	½		BTS-100K	
R88	4.7Meg	½		BTS-4.7Meg	

† Items R64A, R64B, C57A, C57B and C57C are combined in one unit.
* Items R75A, R75B, R75C, C62A, C62B and C62C are combined in one unit.
Note . Some versions use 100KΩ resistors in this application.

TRANSFORMER (POWER)

ITEM No.	RATING			Wells-Gardner PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
	PRI.	SEC. 1	SEC. 2							
T1	117VAC	590VCT	5VAC	53X339B		P-8838 ①				
	② 1.64A	.270ADC	③ 3A			②				
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC									
	④ 9.1A									

① Parallel and phase 6.3V ② 5.6A winding for Sec. #3.
③ Tape other two 6.3V windings.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	Wells-Gardner PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No	Stancor PART No.	Thordarson PART No	Triad PART No.
T2	Vert. Osc. Trans.	54X10	B6702	A-3003	209T1 ①	V405	A-8125	26A03	A-97X
T3	Horiz. Output Trans.	53X346	FB41 & RF800*①	HVO-5 & MWC-1* ①	232T1 & 212R1 * ①	XU10 *	A-8252 & WC-5 *①	FLY-37 *	D-35 & WC-12 * ①
T4	Vert. Output Trans.	51X168	Z1808 ①	A-3039①	226T1 ①	V312 ①	A-8141 ①	26S54 ①	A-1047X①
T5A	Yoke-Horiz. (13.5MH)	9A2334-1 ②	DF802 ③	MDF-72 ③	211D2 ③	Y70F14 ③	DY-8A ③	Y-4 ③	Y-17 ④
B	Vert. (46MH)								
T6	Horiz. Lin. Coil (1.2-6.5MH)	9A2262	RF800④⑤	MWC-6④	213R1	20IR15	WC-8	WC-22	WC-12⑥
T7	Width Coil (.1-.8MH)	9A2183			201R4 ⑦	20IR4 ⑦	WC-4 ⑦	WC-15 ⑦	

① Drill new mounting hole(s).
② Includes resistor R86.
③ Use original yoke damping network.
④ Enlarge mounting hole.
⑤ Connect to terminals #3 and #4.
⑥ Connect to coded blue and green terminals.
⑦ Use original slider, clip and core.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
6	9	9	10	13	9	13	10
5	8	8	8	Jumper 10 & 11	Jumper 8 & 1	Jumper 10 & 11	8
4	5	5	7	6	5	6	7
3	See Note ⑧	See Note ⑧	See Note ⑧	5 or 4	See Note ⑧	5 or 4	See Note ⑧
2	T	T	NC	2	3	2	NC
1	1	1	3	1	1	1	3
A	Term. #3 of RF800	Orange Term. of MWC-1	2	9	Red Term. of WC-5	9	2
G	Term. #4 of RF800	Black Term. of MWC-1	1	8	Blue Term. of WC-5	8	1
Connect Width Coil Across	2 & 1	Red & Blue terms of MWC-1 across "T" & 1	212R1 across 2 & 1	2 & 1	Orange & black term. of WC-5 across 3 & 1	2 & 1	Red & blue terms of WC-12 across 2 & 1
Special Notes →	⑨⑩	⑨⑩	⑩		⑨⑩		⑨ ⑩

⑧ Connect a 47MMF or 56MMF capacitor from open end of R107 (orig. term. #3 connection) to term. #3 of yoke(red lead).
⑨ If the picture is out of phase, reverse width coil primary or secondary.
⑩ Jumper terms. #9 and "T".

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		Wells-Gardner PART No	Halldorson PART No	Merit PART No	Stancor PART No	Thordarson PART No	Triad PART No	NOTES
	PRI.	SEC.							
T8	5.2KΩ	3.7Ω	51X188	Z1107	A-2930	A-3877	24851	S-5X	

SPEAKER

ITEM No.	RATINGS				Wells-Gardner PART No.	QUAM PART No.	NOTES
	SIZE	FIELD	V. C. IMP.				
SP1	6"	PM	3.7Ω		12A516	6A21	① Used in console models
	10"	PM	3.7Ω		12A519 ①	10A31	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	Wells-Gardner PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1A	Ant. Coil	0Ω	0Ω	9A2329-2				Channel 2
B	Ant. Coil	0Ω	0Ω	9A2329-3				Channel 3
C	Ant. Coil	0Ω	0Ω	9A2329-4				Channel 4
D	Ant. Coil	0Ω	0Ω	9A2329-5				Channel 5
E	Ant. Coil	0Ω	0Ω	9A2329-6				Channel 6
F	Ant. Coil	0Ω	0Ω	9A2329-7				Channel 7
G	Ant. Coil	0Ω	0Ω	9A2329-8				Channel 8
H	Ant. Coil	0Ω	0Ω	9A2329-9				Channel 9
I	Ant. Coil	0Ω	0Ω	9A2329-10				Channel 10
J	Ant. Coil	0Ω	0Ω	9A2329-11				Channel 11
K	Ant. Coil	0Ω	0Ω	9A2329-12				Channel 12
L	Ant. Coil	0Ω	0Ω	9A2329-13				Channel 13
L2	Neut. Coil	0Ω		31B-727				
L3A	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-2				Channel 2
B	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-3				Channel 3
C	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-4				Channel 4
D	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-5				Channel 5
E	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-6				Channel 6
F	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-7				Channel 7
G	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-8				Channel 8
H	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-9				Channel 9
I	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-10				Channel 10
J	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-11				Channel 11
K	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-12				Channel 12
L	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-13				Channel 13
L4	Conv. Plate	.1Ω		31K-109				
L5	IF Trap	.1Ω		9A2320	17-4522 *	TV-130 *	6219 *	
L6	1st. Video IF	0Ω		9A2316	17-5001	TV-125 *	6231	
L7	2nd. Video IF	.1Ω	.1Ω	9A2317	17-5003	TV-128	6218 ■	Includes 47.25MC trap
L8	Fil. Choke	0Ω		9A2038	19-1002		4806	2.2 Microhenries
L9	3rd. Video IF	.1Ω	.1Ω	9A2318	17-5001	TV-128 ▲	6233 ▲	
L10	Fil. Choke	0Ω		9A2033	19-1002		4606	2.2 Microhenries
L11	Parasitic Suppressor	0Ω		9A2322				1 turn wire-wound on 10KΩ resistor
L12	Cathode Trap	0Ω		9A2321				
L13	4th. Video IF	.4Ω	.4Ω	9A2319	17-5004	TV-135	6234	
L14	Series Peaking Coil	7Ω		36A10	19-3075		6175	60 Microhenries
L15	Shunt Peaking Coil	17Ω		36A22	19-3300	TV-135	6155	220 Microhenries
L16	4.5MC Trap	.3Ω		9A2074	20-1004	TV-151	1469	
L17	Shunt Peaking Coil	10Ω		36A1	19-3100	TV-131	6177	100 Microhenries
L18	Shunt Peaking Coil	9.5Ω		36A25	19-3100 ♦	TV-131 ♦	6177 ♦	100 Microhenries, wound on 470Ω resistor
L19	Series Peaking Coil	13.5Ω		36A12	19-4150	TV-134 ▲	6180 ▲	150 Microhenries, wound on 22KΩ resistor
L20	Shunt Peaking Coil	14Ω		36A2	19-4201	TV-134	6154	190 Microhenries
L21	1st. Sound IF	2Ω		9A2201	17-1031 ■	TV-113 *	6203 *	
L22	2nd. Sound IF	2.4Ω	2Ω	9A2323	17-1021	TV-113	6203	
L23	Ratio Det.	3.6Ω	.5ΩCT	9A2295	17-3497	TV-115	6205	Tertiary winding-.5Ω
L24	Horiz. Osc.	65Ω		9A2096	19-1578	TV-163	6210	

* Use one winding only.
■ Drill mounting holes.
▲ Detune trap.
♦ Parallel with 470Ω resistor.
▬ Parallel with 22KΩ resistor.

WELLS-GARDNER MODELS 321AM55-A-432-1, 321AM55-A-486-2, 321AM56-A-432-1, 321AM56-A-486-2, 2321AM55-A-488-2, 2321AM56-A-488-2

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	Wells-Gardner PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L25	.270ADC	40.6Ω	.83 HY	52X95	C5037 ①	C-2996 ①	C-2326 ①	26C44	C-23X ①

① Drill one new mounting hole .

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Wells-Gardner PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	4/10A 125V		16X146	313.400 (3AG S/B-4/10A)	357001	MDL 4/10	4405

MISCELLANEOUS

ITEM No.	PART NAME	Wells-Gardner PART No.	NOTES
M2	Tuner	25A1125	VHF - Models 321AM56-A-432-1, 321AM56-A-486-2, and 232lAM56-A-488-2
M3	Tuner	25A1128	UHF-VHF - Models 321AM55-A-432-1, 321AM55-A-486-2 and 232lAM55-A-488-2
M4	Trap	31K-919	VHF Antenna Filter - Models 321AM56-A-432-1, 321AM56-A-486-2 and 2321AM56-A-488-2
	Trap	31K-225-03	VHF Antenna Filter - Models 321AM55-A-432-1, 321AM55-A-486-2 and 2321AM55-A-488-2
M5	Focus Magnet	2A438-2	Includes centering device
M6	Ion Trap	2A421	
B2	Trimmer Cap.	17A269	Horiz. Drive (120-400MMF)
	Knob	10A846-1	Fine tuning - Mahogany (AM55 Series)
	Knob	10A853-1	UHF Channel Selector - Mahogany (AM55 Series)
	Knob	10A852-1	VHF Channel Selector - Mahogany (AM55 Series)
	Knob	10A847-1	Contrast - Mahogany -(AM55 Series)
	Knob	10A830-1	On-off-volume - Mahogany (AM55 Series)
	Knob	10A846-2	Fine tuning - Oak (AM55 Series)
	Knob	10A853-2	UHF Channel Selector - Oak (AM55 Series)
	Knob	10A852-2	VHF Channel Selector - Oak (AM55 Series)
	Knob	10A847-2	Contrast - Oak (AM55 Series)
	Knob	10A830-3	On-off-volume - Oak (AM55 Series)
	Knob	10A820-1	Fine tuning - Mahogany (AM56 Series)
	Knob	10A842-1	VHF channel selector - Mahogany (AM56 Series)
	Knob	10A840-1	Contrast - Mahogany (AM56 Series)
	Knob	10A843-1	On-off-volume - Mahogany (AM56 Series)
	Knob	10A820-2	Fine tuning -Oak (AM56 Series)
	Knob	10A842-2	VHF channel Selector - Oak (AM56 series)
	Knob	10A840-2	Contrast - Oak (AM56 Series)
	Knob	10A843-2	On-off-volume - Oak (AM56 Series)
	Safety Glass	17X187	Console Models
	Safety Glass	17X189	Table Models
	Mask	4X1241-3	Console Models
	Mask	4X1241-4	Table Models

TROUBLE SHOOTING AIDS (cont)

L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution-V18, V19, V20 and V21. Check waveform W18.

If Satisfactory	If Unsatisfactory
Check T3, T5A, T6, T7, C82, C81, C84, C80, R103, R104, and other associated components.	Check L24, C76, C77, R95, R98, R94, R96 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V19, V20 and V22. Check T3, T5A, R103, R104, and other associated components.

BLOOMING

Check by substitution V19, V20, V21 and V22. Check R109, R103, R104, R102, C7 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss Of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak Or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6, V7 and V8. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

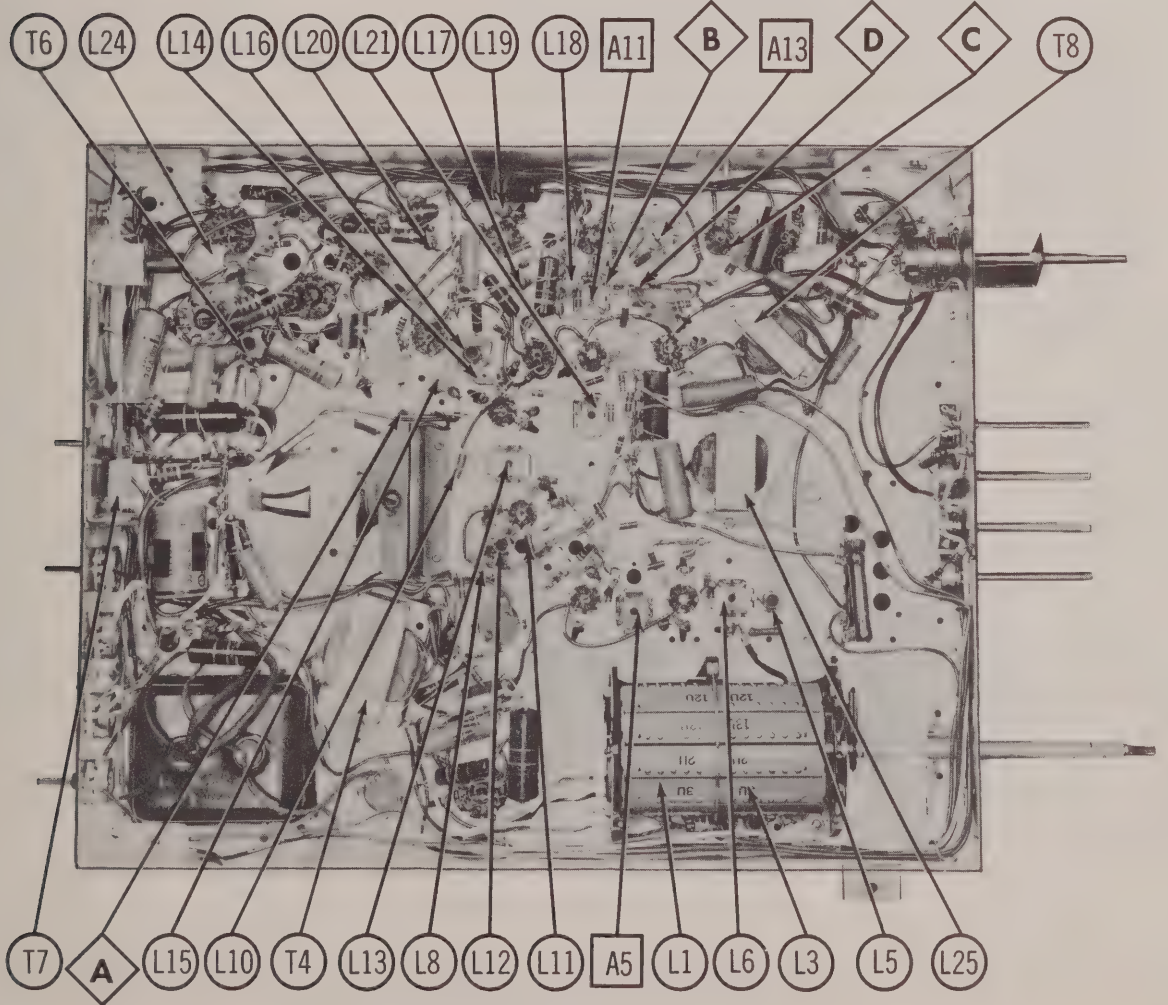
KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

WELLS-GARDNER MODLES 321AM55-A-432-1, 321AM55-A-486-2, 321AM56-A-432-1, 321AM56-A-486-2, 2321AM55-A-488-2, 2321AM56-A-488-2

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF Tuner oscillator Circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible , one at a time, through the small hole in the cabinet above and slightly to the left of the channel selector shaft.

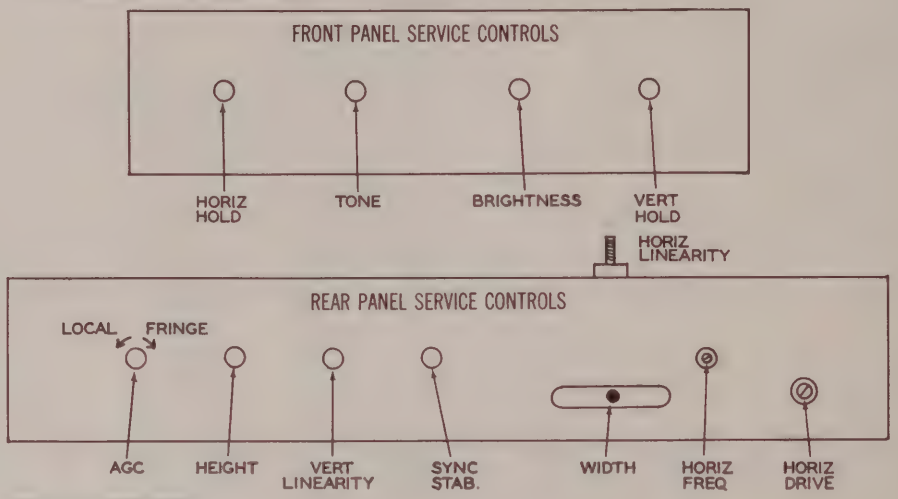
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 5 wood screws holding plastic strip at the top of the safety glass. Remove plastic strip and safety glass. The extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



SPECIAL ADJUSTMENTS:

AGC CONTROL ADJUSTMENT

Turn set on and tune in strongest station in that area. Turn the AGC control(R6) clockwise until the picture shows signs of overloading, faded out picture and buzz in sound. Turn R6 back counter clock wise from the point where overloading occurs until no sign of overloading is noted.

SYNC STABILITY CONTROL ADJUSTMENTS

Turn set on and tune in strongest TV station in that area. Rotate the sync stability control (R9) clockwise until bending is noted near the top of picture. Turn R9 counter clock wise until picture bending disappears and sync is stable.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontol hold control at its mid-range position and adjust the horzontol frequency slug (L24) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz adjust the ratio detector secondary (L23) located on top of chassis.

FUSES

One fuse is used for L.V. power supply protestion. (For location see tube placement chart.)

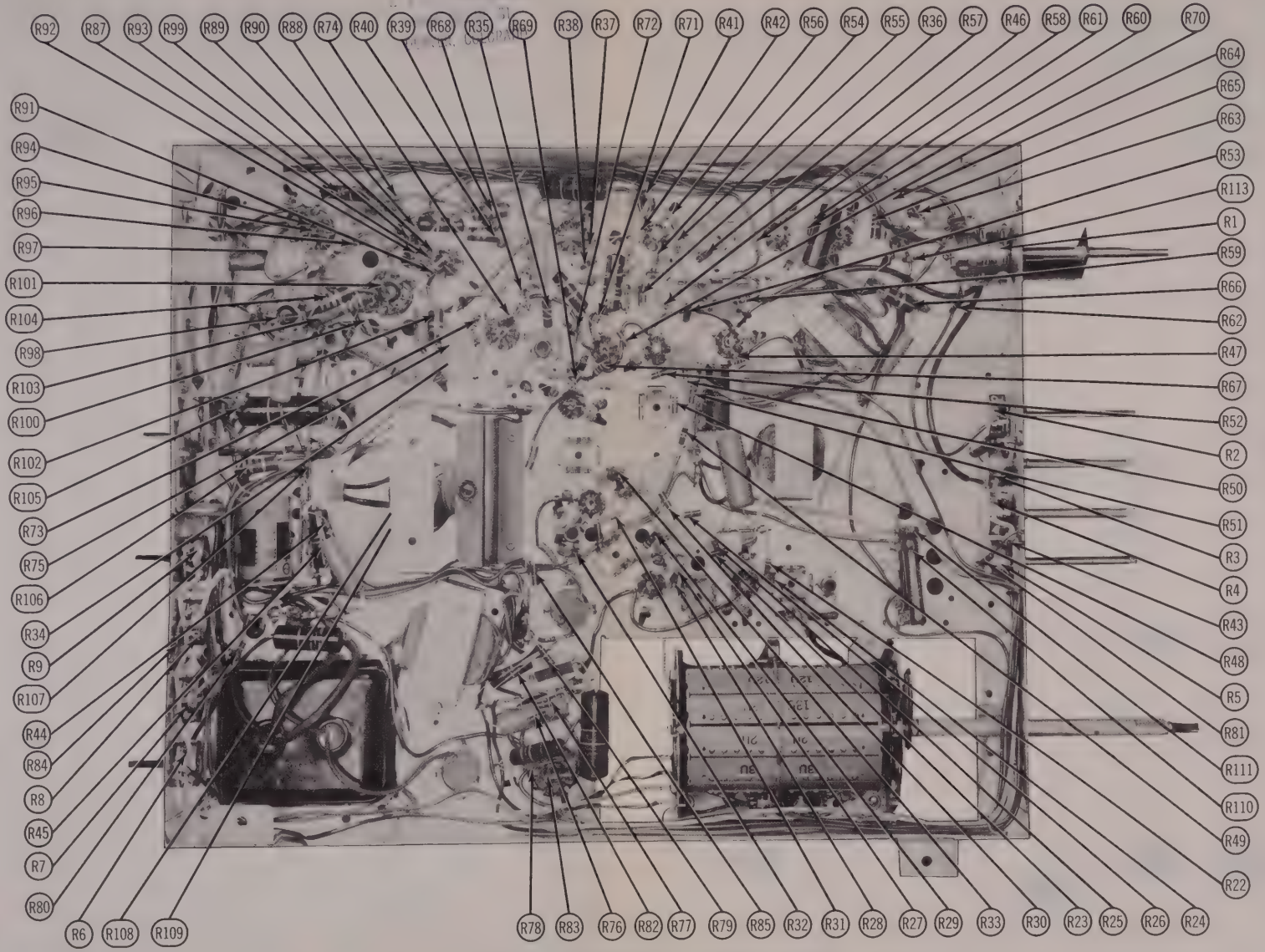
CENTERING

Centering is accomplished mechanically by means of a centering lever on the P.M Focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

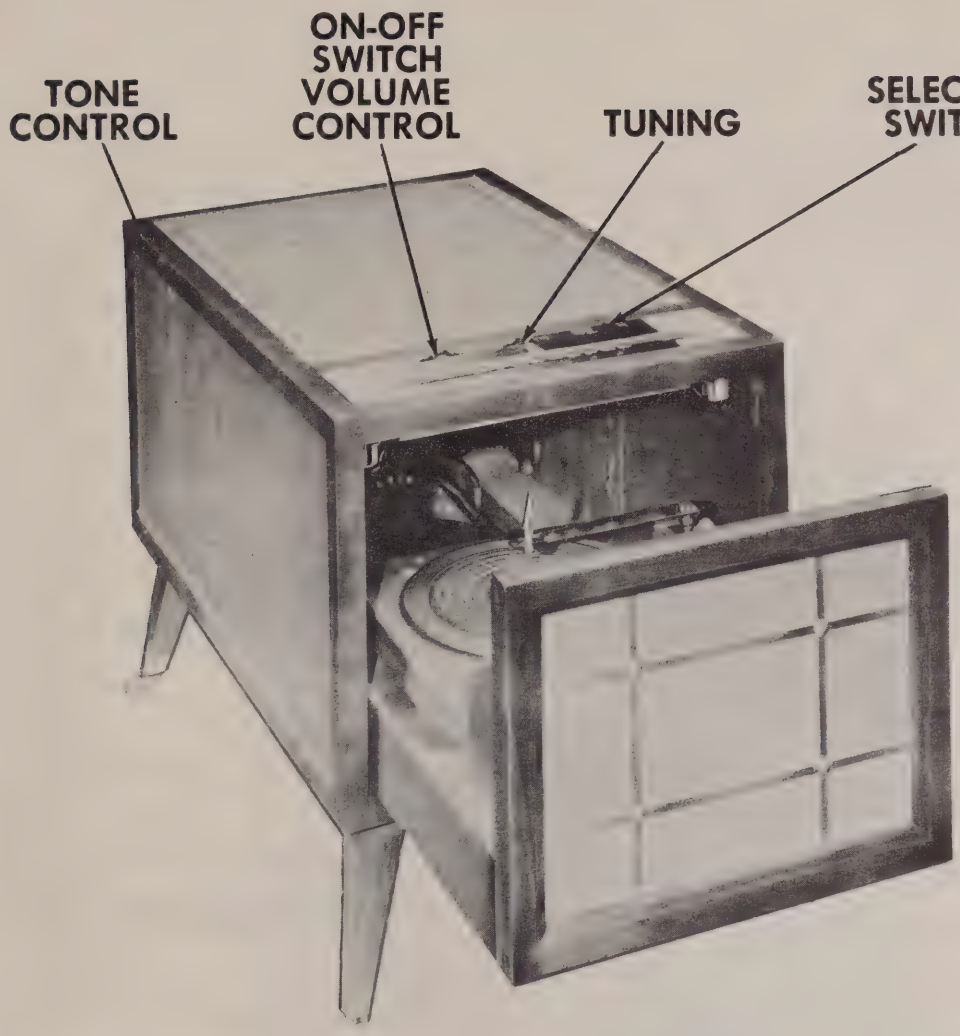
CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from front panel of cabinet.
2. Remove 4 wood screws. Remove rear cover.
3. Remove 2 wood screws holding antenna bracket.
4. Disconnect speaker leads.
5. Remove 4 speaker nuts. Remove speaker.
6. Remove 5 chassis bolts. Remove chassis.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

ZENITH MODELS HFR845R, HFR846E, H (Ch. 8R21)



DENVER, COLORADO

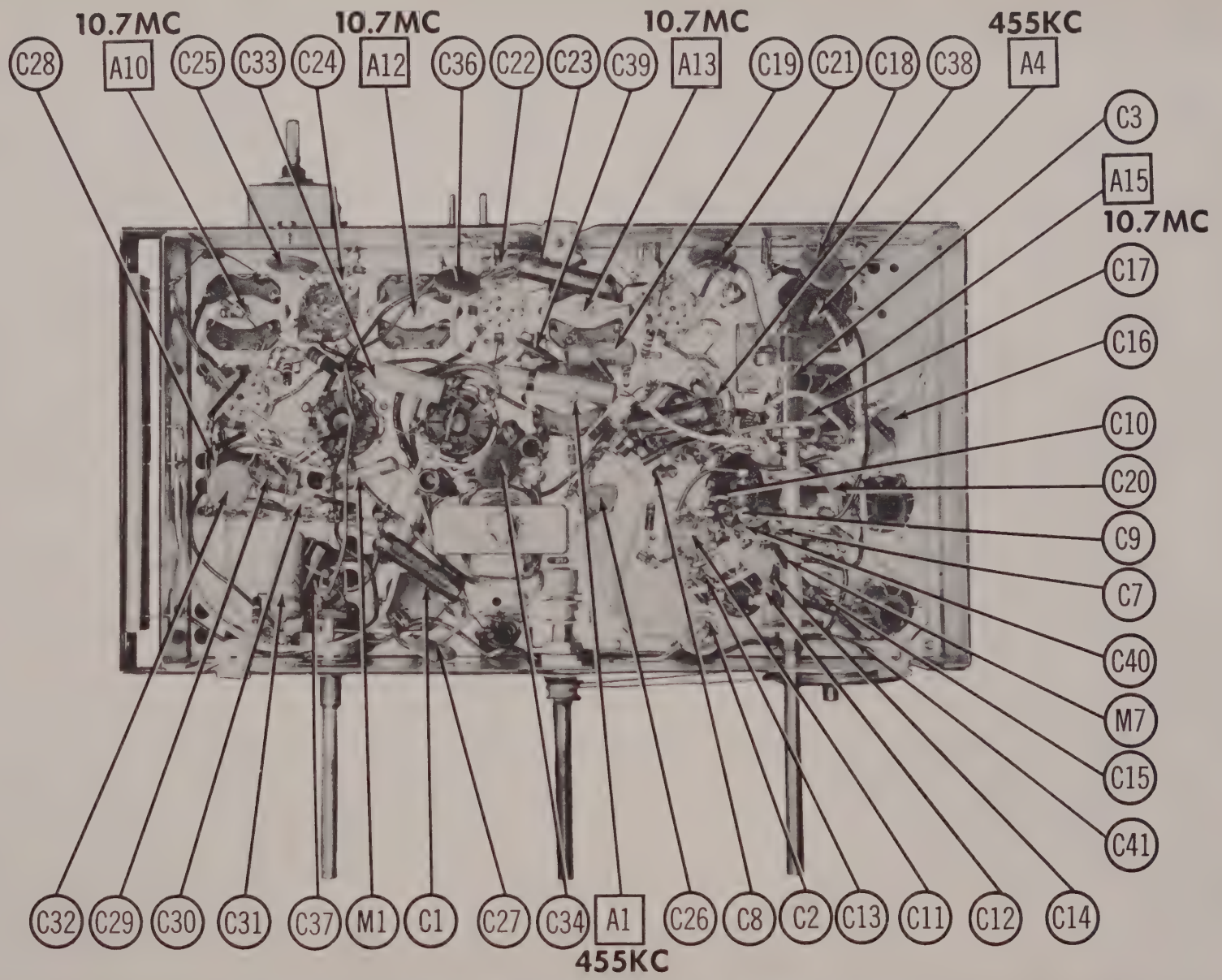
ZENITH MODELS HFR845R, HFR846E, H (Ch. 8R21)

TRADE NAME	Zenith Models HFR845R, HFR846E, H (Ch. 8R21)	
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Ill.	
TYPE SET	AC Operated AM-FM-Phono Combination Superheterodyne Receiver	
TUBES (Eight)	Types 6BJ6 FM AM RF Amp., 12AT7 FM AM Mixer-Osc., 12BA6 FM AM IF Amp., 12BA6 2nd. FM IF Amp., 12AU6 FM Limiter, 19T8 Ratio Det.-AM Det.-AVC-AF Amp., 25L6GT Output, 25Z6GT Rectifier	
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING .32 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540KC-1620KC	FREQ. MOD. 88MC-108MC

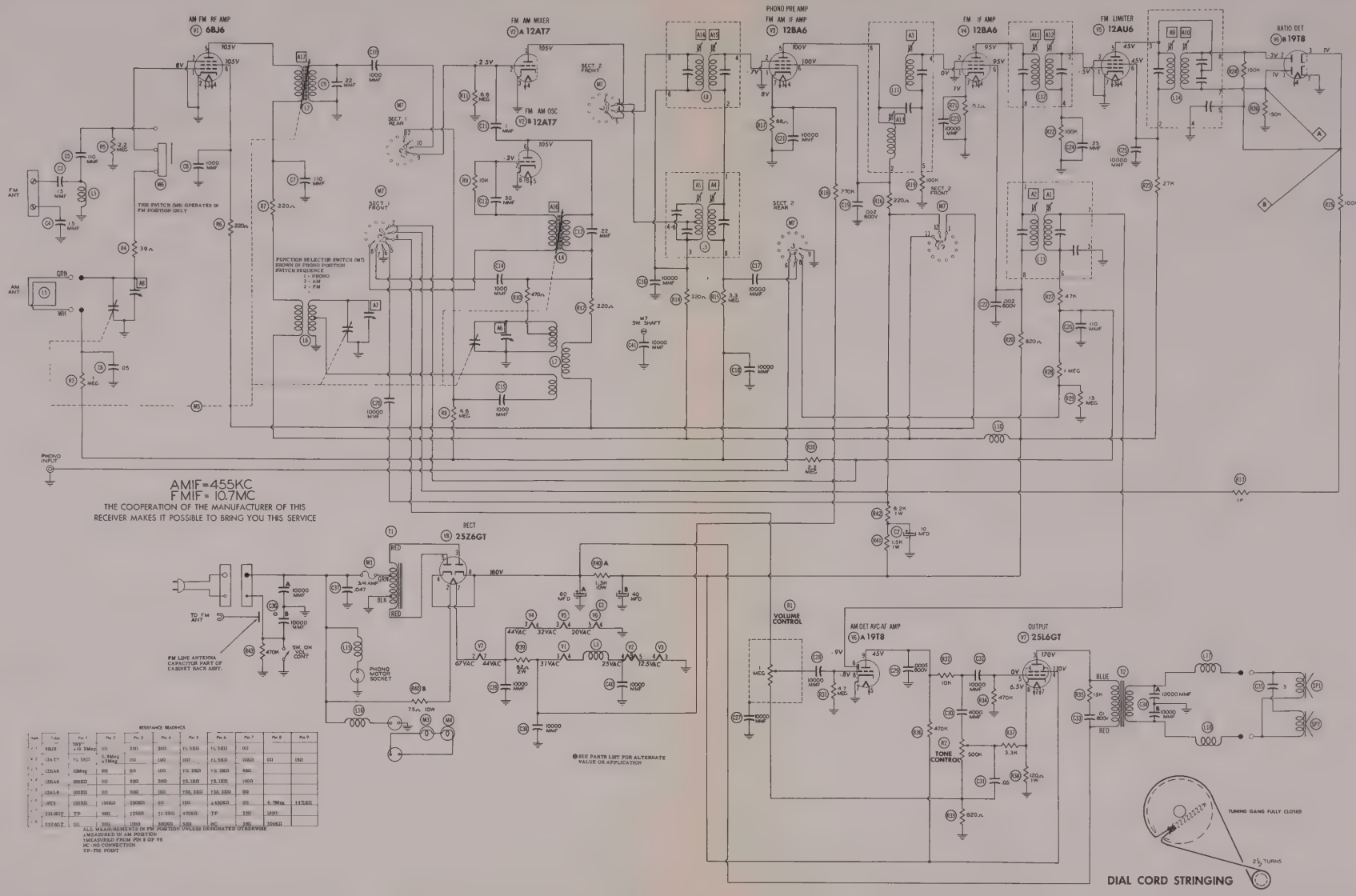
ZENITH RECORD CHANGER UNIT S-14061

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America



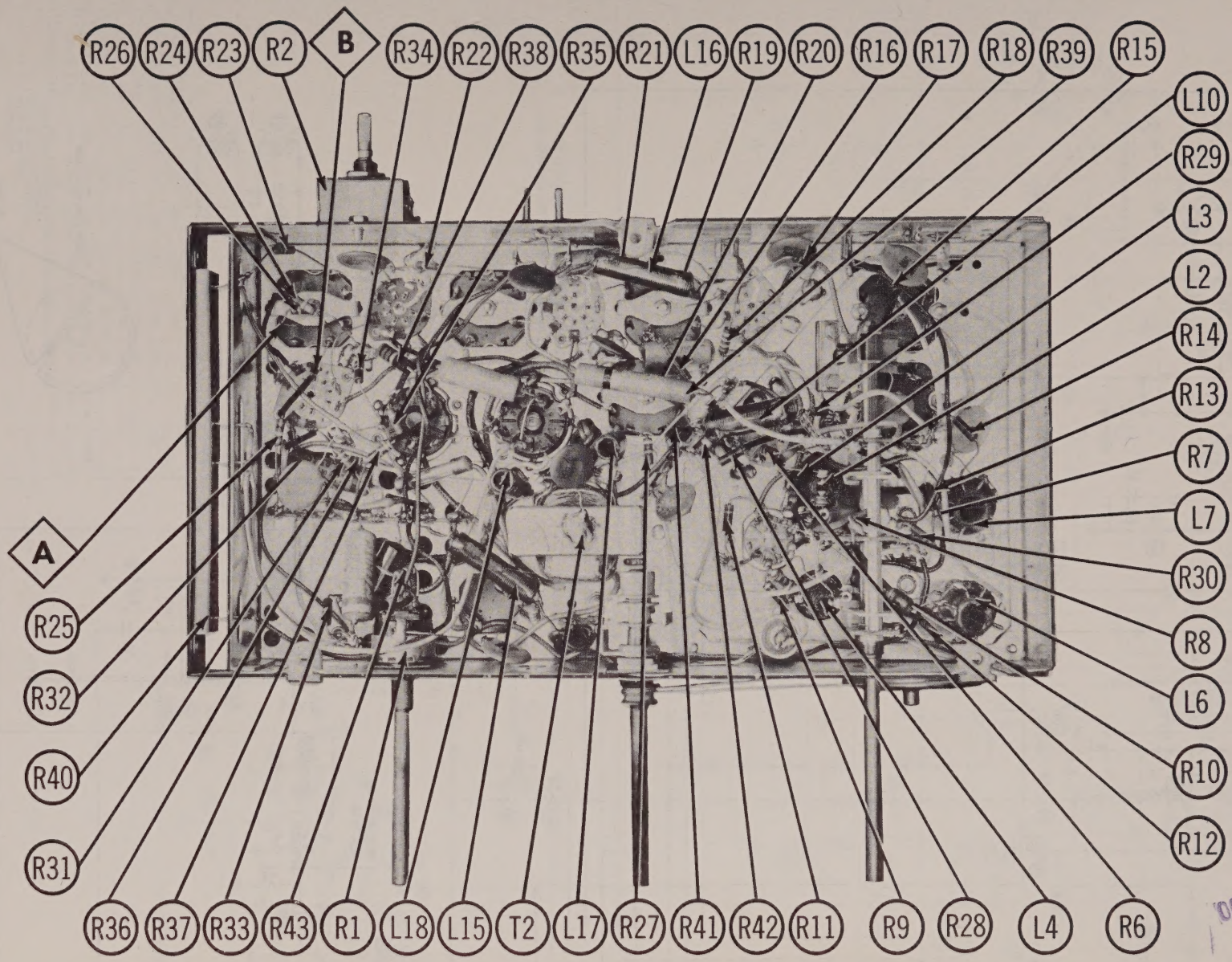
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1955

297-11



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

DENVER, COLORADO
3524 MEADE ST.

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
To set pointer, turn tuning capacitor fully closed and set pointer parallel with base of dial.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to pin 2 (grid) of 12AT7 (V2). Low side to chassis.	455KC (400~Mod)	BC	600KC	Across voice coil	A1, A2, A3, A4, A5	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		High side to AM antenna terminal. Low side to chassis.	1620KC	"	Tuning gang fully open	"	A6	Adjust for maximum output.
3.		"	1400KC	"	1400KC	"	A7, A8	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Increase generator output slightly when adjusting A10. Use 2Meg resistor in series with DC probe.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.05MFD	High side to pin 1 (grid) of 12AU6 (V5). Low side to chassis.	10.7MC (Unmod)	FM	Point of non-interference	DC probe to point (A). Common to chassis.	A9	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe to point (B). Common to chassis.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
6.	"	High side to pin 1 (grid) of 12BA6 (V4). Low side to chassis.	"	"	"	DC probe to pin 1 (grid) of 12AU6 (V5). Common to chassis.	A11, A12	Adjust for maximum deflection.
7.	"	High side to pin 1 (grid) of 12BA6 (V3). Low side to chassis.	"	"	"	"	A13	"
8.	"	High side to pin 2 (grid) of 12AT7 (V2). Low side to chassis.	"	"	"	"	A14, A15	Adjust for maximum deflection. Repeat steps 6, 7 and 8.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.05MFD	High side to pin 1 (grid) of 12AU6 (V5). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. to point (A). Low side to chassis.	A9	Adjust for curve of maximum amplitude and symmetry, similar to Fig. 1.
5.	"	"	"	"	"	Vert. Amp. to point (B). Low side to chassis.	A10	Adjust so that 10.7MC occurs at center of crossover lines, similar to Fig. 2. Slightly retouch A9 for maximum amplitude and straightness of crossover lines.
6.	"	High side to pin 1 (grid) of 12BA6 (V4). Low side to chassis.	"	"	"	Vert. Amp. to pin 1 (grid) of 12AU6 (V5).	A11, A12	Adjust for curve of maximum amplitude and symmetry, similar to Fig. 1.
7.	"	High side to pin 1 (grid) of 12BA6 (V3). Low side to chassis.	"	"	"	"	A13	"
8.	"	High side to pin 2 (grid) of 12AT7 (V2). Low side to chassis.	"	"	"	"	A14, A15	"

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
9.	270Ω Carbon Resistor	High side thru 270Ω to FM antenna terminal. Low side to terminal "G".	98MC (Unmod.)	FM	98MC	DC probe to pin 1 (grid) of 12AU6 (V5). Common to chassis.	A16, A17	Adjust for maximum deflection in order given.

FIG. 1

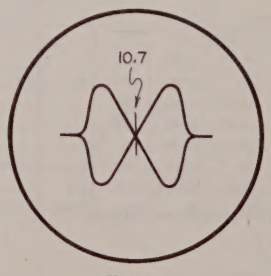


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		ZENITH PART No.	STANDARD REPLACEMENT		
V1	FM-AM RF Amp.	6BJ6	6BJ6	7CM	
V2	FM-AM Mixer-Osc	12AT7	12AT7	9A	
V3	IF Amp-Preamp.	12BA6	12BA6	7BK	
V4	FM IF Amp.	12BA6	12BA6	7BK	
V5	FM Limiter	12AU6	12AU6	7BK	
V6	Ratio Det. - AM Det. -AVC- AF Amp.	19T8	19T8	9E	
V7	Audio Output	25L6GT	25L6GT	7S	
V8	Rectifier	25Z6GT	25Z6GT	7Q	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	ZENITH PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲80	250	22-2105	FP227.5	TM-8040-450	D-140	
B	▲40	250					
C2	10	250	22-2154	TC52	TD-10-250	FM-2512	

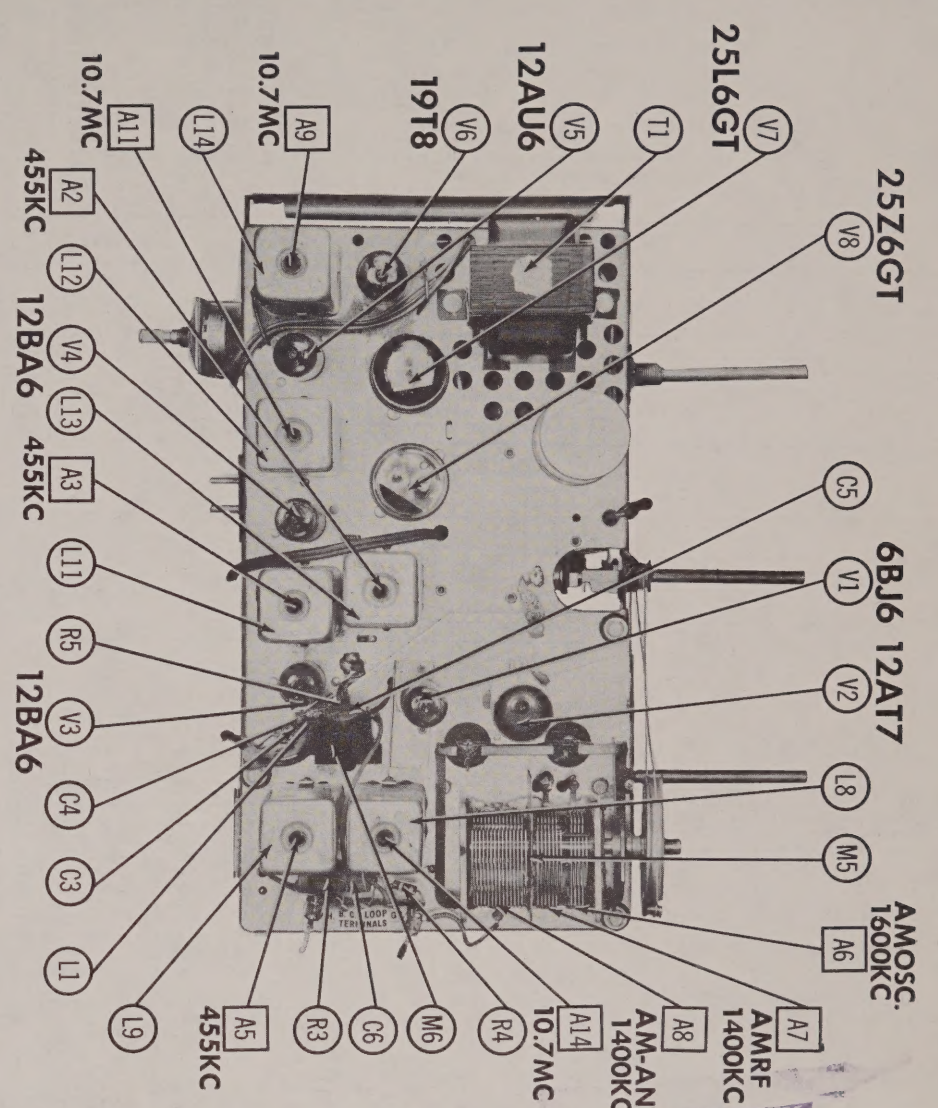
FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	ZENITH PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C3	15		22-2140	D6-150	NPOK-150		
C4	15		22-2140	D6-150	NPOK-150		
C5	110		22-5	TCZ-110	NPO-333-111		
C6	.05	200	22-829	DF-503		PT415	
C7	110		22-5	TCZ-110	NPO-333-111		
C8	1000		22-1676	D6-102	GP2L-102	UC-521	
C9	22		22-1506				
C10	1000		22-1676	D6-102	GP2L-102	UC-521	
C11	1		22-1762	TCZ-1	NPOA-010		
C12	22		22-1506				
C13	50		22-1367	TCA-47	NPO-338-470		
C14	1000		22-1676	D6-102	GP2L-102	UC-521	
C15	1000		22-1676	D6-102	GP2L-102	UC-521	
C16	10000		22-3	DD-103	811-01	DC511	
C17	10000		22-3	DD-103	811-01	DC511	
C18	10000		22-3	DD-103	811-01	DC511	
C19	.002	600	22-1220	D6-202	GP2-333-202	PT622	
C20	10000		22-3	DD-103	811-01	DC511	
C21	10000		22-3	DD-103	811-01	DC511	
C22	.002	600	22-1220	D6-202	GP2-333-202	PT622	
C23	10000		22-3	DD-103	811-01	DC511	
C24	25		22-1507	TCN-25	N750K-250	ZT5425	
C25	10000		22-3	D6-103	811-01	DC511	
C26	110		22-5	TCZ-110	NPO-333-111		
C27	10000		22-3	D6-103	811-01	DC511	
C28	10000		22-3	D6-103	811-01	DC511	
C29	.0005	600	22-854	D6-501	GP2K-501	MC245	
C30	4000		22-4	D6-402	GP2-333-402	UC-5240	
C31	.05	200	22-829	DF-503		PT415	
C32	10000		22-3	DD-103	811-01	DC511	
C33	.01	600	22-669	D6-103	GP3-333-103	PT411	
C34A	10000	} 22-2276		DD3-103	{ 811-01	{ DC511	
B	10000	}			{ 811-01	{ DC511	
C35	.5	120				PT405	
C36A	10000		22-2276	DD3-103	811-01	DC511	Note 1
B	10000				811-01	DC511	Note 1
C37	.047	400	22-1775	DF-503		PT4147	
C38	10000		22-3	DD-103	811-01	DC511	
C39	10000		22-3	DD-103	811-01	DC511	
C40	10000		22-3	DD-103	811-01	DC511	
C41	10000		22-3	DD-103	811-01	DC511	

Note 1. Some versions may use a 4700 dual disc (part number 22-2567) in this application.

CHASSIS—TOP VIEW



DENVER, COLORADO
3924 MEADE ST.
L. F. BLANKENSHIP
...RTY OF

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1Meg	½	63-2861	Q11-137	A47-1Meg-S	AB-69	U-54	Volume
B	Shaft		Not Req.	Not Req.	RS-5	AK-9	DS-36	Attach to R1A.
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A.
R2A	500K	½	63-2862	Q11-133	A47-500K-S	AB-617	U-50	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R3	1Meg	½	63-1912	BTS-1Meg	
R4	39Ω	½	63-1726	BTS-39	
R5	2.2Meg	½	63-1926	BTS-2.2Meg	
R6	220Ω	½	63-1758	BTS-220	
R7	220Ω	½	63-1758	BTS-220	
R8	6.8Meg	½	63-1947	BTS-6.8Meg	
R9	10KΩ	½	63-1827	BTS-10K	
R10	470Ω	½	63-1772	BTS-470	
R11	6.8Meg	½	63-1947	BTS-6.8Meg	
R12	220Ω	½	63-1758	BTS-220	
R13	1000Ω	½	63-1786	BTS-1000	
R14	220Ω	½	63-1758	BTS-220	
R15	3.3Meg	½	63-1933	BTS-3.3Meg	
R16	220Ω	½	63-1758	BTS-220	
R17	68Ω	½	63-1736	BTS-68	
R18	270KΩ	½	63-1887	BTS-270	
R19	100KΩ	½	63-1870	BTS-100K	
R20	820Ω	½	63-2091	BW½-820	
R21	100Ω	½	63-1744	BTS-100	
R22	100KΩ	½	63-1870	BTS-100K	
R23	27KΩ	½	63-1845	BTS-27K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R24	150KΩ	½	63-1876	BTS-150K	
R25	100KΩ	½	63-1869	BTS-100K	
R26	150KΩ	½	63-1876	BTS-150K	
R27	47KΩ	½	63-1856	BTS-47K	
R28	1Meg	½	63-1912	BTS-1Meg	
R29	15Meg	½	63-1961	BTS-15Meg	
R30	2.2Meg	½	63-1926	BTS-2.2Meg	
R31	4.7Meg	½	63-1940	BTS-4.7Meg	
R32	10KΩ	½	63-1828	BTS-10K	
R33	820Ω	½	63-1782	BTS-820	
R34	470KΩ	½	63-1898	BTS-470K	
R35	15KΩ	½	63-1834	BTS-15K	
R36	470KΩ	½	63-1898	BTS-470K	
R37	3300Ω	½	63-1806	BTS-3300	
R38	120Ω	1	63-1961	BTA-120	
R39	82Ω	2	63-2428	BW2-82	
R40A	1300Ω	10	♦63-2068		
B	75Ω	10			
R41	1500Ω	½	63-1793	BTS-1500	
R42	8200Ω	1	63-1576	BTA-8200	
R43	470KΩ	½	63-1898	BTS-470K	

♦ R40A, R40B are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC ⓐ .32A Tap ⓐ 346VCT .113ADC				95-1188					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	2.8KΩ	3.5Ω	95-1272	Z1104 ①	A-3018	A-3849	26S50	S-1X ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	ZENITH PART No.	QUAM PART No.	
SP1	10"	PM	3.5Ω	49-766	10A31	
SP2	3½"	PM	10.6Ω	49-759	3A15T	

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	FM RF Choke	0Ω		S-16408	19-3001		4602	1 Microhenry
L2	FM RF Coil	0Ω	0Ω	S-15743				
L3	Fil. Choke	1Ω		S-13997	19-1005		4612	9.5 Microhenries
L4	FM Osc. Coil	0Ω	0Ω	S-15691				
L5	AM Loop Ant.	1.2Ω		S-20042				
L6	AM RF Coil	2.6Ω	11Ω*	S-16344				*Tapped ⓐ 3.3Ω
L7	AM Osc. Coil	1.1Ω	8.5Ω■	S-16345				Tertiary Winding=1.1Ω ■Tapped ⓐ 3.7Ω
L8	1st FM IF	.4Ω	.4Ω	95-1201	16-6665*	FM-251	1451	
L9	1st AM IF	4.6Ω	15Ω	95-1248				
L10	RF Coil	0Ω		20-337	19-1003	BC-537	4608	4.2 Microhenries
L11	2nd FM & AM IF	1.5Ω	26Ω	95-1251				
L12	3rd FM IF	.4Ω	.4Ω	95-1150	16-3487■	FM-251▲	1451▲	
L13	3rd AM IF	15Ω	15Ω	95-1102	16-6770■	BC-355■	12-C6■	
L14	Discriminator	.4Ω	.4Ω	95-1153	17-3484♦	FM-250♦	1452♦	
L15	RF Coil	0Ω		20-337	19-1003	BC-537	4608	4.2 Microhenries
L16	RF Coil	0Ω		20-337	19-1003	BC-537	4608	4.2 Microhenries
L17	RF Coil	0Ω		20-337	19-1003	BC-537	4608	4.2 Microhenries
L18	RF Coil	0Ω		20-337	19-1003	BC-537	4608	4.2 Microhenries

*Drill new mounting holes.
■Remove center spade bolt mounting support & use adaptor plate.
▲Remove center spade bolt mounting support.
♦Add diode filter cap. externally & remove center spade bolt mounting support.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			ZENITH PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG P/T	3/4A 250V			318.750 (3AG P/T 3/4A)		GJV 3/4	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	ZENITH PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M2	142-71 (or) 142-72					

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M3	Dial Light	100-97	115-125V 10W
M4	Dial Light	100-97	115-125V 10W
M5	Tuning Cap.	22-2482	3 Gang (22-482MMF, 11-210MMF, 12-85MMF)
M6	Switch	85-505	AM-FM (Ant.) SPDT Slide Type-Actuated by M7.
M7	Switch	85-529	Selector (Rotary-Wafer Type)
	Record Changer	S-14061	Variable Speed (16 2/3, 33 1/3, 45, 78RPM)
	Cabinet	14-1754R	Model HFR845R
	Cabinet	14-1763E	Model HFR846E
	Cabinet	14-1763H	Model HFR846H
	Knob	46-1170	Tone
	Knob	46-1168	Tuning & On-Off-Volume
	Knob	46-1166	Selector
	Dial Scale	26-499	
	Dial Pointer	59-291	